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## Integration of Environmental Planning Into the Army Master Planning Process

by  
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Environmental concerns are an integral part of the Army's master planning process, as a required component of installation master plan reports, and as subsequently evaluated in an Environmental Assessment (EA) or Environmental Impact Statement (EIS). Still, the Army can do more to fully account for environmental concerns in its master planning efforts, to create environmentally sensitive master plans that reduce long-term costs, and to prepare environmental assessment documents in full compliance with the spirit and intent of the National Environmental Policy Act (NEPA). Four problems make it difficult for planners to make the Army master planning process more environmentally sensitive: (1) the size and complexity of master planning regulations, (2) the lack of clarity and consistency in the master planning regulations regarding the format, content, and timing of the environmental components; (3) the need for a stronger policy direction on environmental concerns in the master planning regulations; and (4) inconsistencies between the Army regulations for master planning and for environmental impact assessment. The result is often the ineffective and redundant preparation of separate master planning and environmental reports.

This report examines the integration of environmental planning into the Army installation master planning process, emphasizing proposed revision to the Master Plan regulations (AR 210-20) and improved coordination with the environmental assessment of master plans. The study suggests that a comprehensive "program-level" environmental assessment or "Master Environmental Impact Assessment" should be prepared concurrently with the master plan with subsequent "tiered" assessment of more specific actions within the program of the Master Plan. Automated tools and techniques to assist in integrated planning are reviewed.

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## CONTENTS

	Page
SF 298	1
FOREWORD	2
<b>1 INTRODUCTION .....</b>	<b>5</b>
Background	5
Objectives	6
Approach	6
Mode of Technology Transfer	7
<b>2 THE MASTER PLANNING PROCESS .....</b>	<b>8</b>
Master Plan Regulations/Guidelines	8
A Proposed Master Planning Process	20
Project Level Planning Documents	25
Intergovernmental and Public Coordination	25
Summary of Concerns	26
Recommendations	27
<b>3 THE ENVIRONMENTAL PLANNING/ASSESSMENT PROCESS .....</b>	<b>30</b>
Environmental Planning and Assessment Regulations/Guidelines	30
Environmental Compliance	35
Mitigation Monitoring	37
Integration With the Planning Process	37
Programmatic Review and Tiering	40
Environmental Goals and Objectives	41
Summary of Concerns	42
Recommendations	43
<b>4 INTEGRATION OF ENVIRONMENTAL AND MASTER PLANNING .....</b>	<b>46</b>
Which Should Come First?	46
History of the Integrated Approach	47
A Proposed Iterative Process	47
Proponent Benefits	51
Integration Into Existing Processes	52
<b>5 AUTOMATED TOOLS AND TECHNIQUES: AN AVENUE FOR INTEGRATION .</b>	<b>53</b>
Introduction	53
Master Planning/Environmental Assessment Applications	54
Current Systems	55
Recommendations	56
<b>6 CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>59</b>
Conclusions	59
Recommendations	59
<b>REFERENCES</b>	<b>62</b>
<b>APPENDIX A: Memoranda</b>	<b>67</b>
<b>APPENDIX B: Automated Tools Systems</b>	<b>76</b>
<b>ABBREVIATIONS AND ACRONYMS</b>	<b>83</b>
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## **INTEGRATION OF ENVIRONMENTAL PLANNING INTO THE ARMY MASTER PLANNING PROCESS**

### **1 INTRODUCTION**

#### **Background**

Environmental protection and enhancement has become a national priority in the United States. For Army master planners, environmental awareness comes both from a regard for the health of the natural environment and from a realization of the great expense that can result from environmental neglect. The U.S. Army has been criticized in the past due to a perceived neglect of the environment, from instances such as soil erosion from training activities and from hazardous materials contamination occurring prior to current regulations. In fact, environmental concerns have long been an integral part of the Army's master planning process, as a required component of installation master plan reports (i.e., the Environmental Quality Protection Plan), and again as that component is subsequently evaluated in an Environmental Assessment (EA) or Environmental Impact Statement (EIS) prepared pursuant to the National Environmental Policy Act (NEPA) of 1969.

Still, the Army can do more to fully account for environmental concerns in its master planning efforts, to create environmentally sensitive master plans that reduce long-term costs, and to prepare NEPA documents in full compliance with the spirit and intent of the law. Related issues include the need to streamline and clarify voluminous and often confusing master plan regulations; to improve consistency between master plan and environmental regulations; to reduce redundancy in the preparation of master planning and environmental reports; and, in general, to achieve better compliance with environmental regulations. In addition, as increasing numbers of Army bases are returned to civilian use, there is an expanded need for coordination between the Army and other units of government and the public at large as part of the master planning process.

Four basic problems currently make it difficult for planners to make the Army master planning process more environmentally sensitive: (1) the sheer size and complexity of master planning regulations; (2) the lack of clarity and consistency in the master planning regulations regarding the format and content of the environmental component and the timing and scope of environmental assessment; (3) the need for a stronger policy direction on environmental concerns in the master planning regulations; and, (4) inconsistencies between the master planning and NEPA Army regulations, often resulting in a lack of consistency in interpretation and implementation. The result of these factors is often an ineffective and redundant preparation of separate master planning and environmental reports.

In addition, there are several institutional barriers that may make the full integration of environmental planning into the master planning process difficult. To achieve greater environmental sensitivity and compliance, these barriers must be overcome. First, the Army's master planning process is long and complex. Many Army regulations and guidelines cover the full range of master planning topics, from mobilization, to utility networks, to transportation systems, yet all of these documents are not consistent with each other. As a result, environmental concerns are sometimes obscured or overshadowed in the master planning process. Too often, environmental assessment of master plans is seen as "just another regulatory hurdle" in the long path to master plan implementation. Because the Army prepares and approves its own environmental documents, there is a lack of checks and balances that ensure a fully objective and complete environmental review.

Finally, while Army regulations and technical reports cite many general program goals for master planning and environmental assessment, a cohesive overriding policy statement that guides master planners and environmental compliance specialists still needs to be adopted. The Army's environmental regulations

encourage integration with master planning efforts; master planning regulations do not. There has been little incentive to accomplish complete and integrated environmental planning, and little funding has been made available for such efforts.

To resolve these problems, the Army has begun to explore ways to better integrate the environmental and master planning processes. Such integration can lead to a more efficient, less costly master planning effort. As environmental concerns are included early and throughout the planning effort, environmental mistakes can be minimized, master plans will become more environmentally sensitive, and the environmental review documents will become more useful and comprehensive. A fuller integration of the two processes can also make subsequent mission and construction project planning more efficient and cost-effective.

The Army is currently undertaking a major revision to its primary master plan regulation, AR 210-20, *Master Planning for Army Installations*. This update presents an excellent opportunity to encourage integration with environmental planning and to enhance environmental compliance.

### **Objectives**

The objectives of this study were to investigate ways to integrate environmental planning into the master planning process by:

1. Exploring ways to make the master planning process more responsive to environmental concerns through proposed revisions to the process and the relevant regulations
2. Identifying environmental assessment approaches most suitable to comprehensive master plan evaluation and later implementation efforts
3. Identifying ways to improve the efficiency and cost-effectiveness of the master planning and environmental assessment processes
4. Identifying ways to make the master planning/environmental assessment processes more supportive of installation program and mission goals
5. Addressing means of enhancing compliance with environmental regulations through both the master planning and environmental assessment processes
6. Addressing ways to ensure effective environmental mitigation and restoration efforts
7. Addressing ways to improve coordination with other agencies and the public at large during the master planning/environmental assessment process
8. Identifying tools and techniques that will help integrate environmental and master planning, with emphasis on automated systems, information sources, and emerging technologies

### **Approach**

This study began with a summary review of the relevant Army regulations, manuals, and reports, specifically touching on the master planning process, environmental assessment, and other environmental regulations. Problem areas, areas of overlap, and areas of conflict were identified. Next, a review of the current literature on integration of the environmental/master planning processes was conducted and applicability to the Army was addressed. Specific topics of environmental compliance, mitigation

monitoring, and interagency coordination were addressed. The availability of appropriate tools and techniques was also researched for applicability to the integration effort.

Based on this review and evaluation, a system for integration of environmental and master planning was proposed, including revisions to the current planning and environmental review processes. Potential concerns and benefits of an integrated system were identified and approaches for implementation were explored. Finally, a series of additional recommendations and suggestions for further research were made, setting the stage for continued and ongoing evaluation of this important area of concern.

#### **Mode of Technology Transfer**

It is anticipated that the recommendations of this study may be incorporated into a revision of Army Regulation (AR) 210-20 and related regulations and guidelines. Workshops and training seminars are anticipated to familiarize users with the proposed integrated approach to planning presented here. Once the revisions to AR 210-20 are underway, the remaining recommendations of this report may be pursued, including making consistent revisions to other documents, preparing a model master plan, preparing guidelines for Master Environmental Impact Assessments, and conducting further research.

## 2 THE MASTER PLANNING PROCESS

The installation master plan represents a comprehensive documentation of the installation as it exists today, and a plan for its future development. The master plan allows the focusing of installation efforts and resources towards a clear-cut set of goals. It also promotes efficient and economical allocation of resources, minimizes conflicting land use, [and] allows Army and other governmental planning at various levels to be integrated . . . . The success of these planning efforts will directly affect the quality of life in both the working and living environments of nearly every person on the installation, both today and in the future (DA PAM 420-9).

### Master Plan Regulations/Guidelines

Master planning (for Army installations) is addressed by numerous regulations and technical reports. A recent review of these documents (Wheeler, et al. 1988) identified five major topical Army Regulation (AR) series related to Army master planning: (1) AR 200, *Environmental Quality*; (2) AR 210, *Installations*; (3) AR 405, *Real Estate*; (4) AR 415, *Construction*; and (5) AR 420, *Facilities Engineering*, containing a total of 83 regulations. In addition, two major technical manual series (5-800 and 5-803) relate to Army master planning. These series contain many documents to guide the Army master planner.

#### *AR 210-20, Master Planning for Army Installations*

The primary master planning regulation is AR 210-20, *Master Planning for Army Installations*. AR 210-20 has been revised many times since it was originally published 11 June 1946. Since AR 210-20 is currently under revision, this report will address the 12 June 1987 version of AR 210-20 as well as some of the revisions under consideration. In brief, AR 210-20:

explains the concept of comprehensive planning and establishes policies, procedures, and responsibilities for implementing the Army Installation Master Planning Program. It also establishes the requirement for an installation master plan and planning board and specifies procedures for developing, submitting for approval, updating, and implementing the master plan (AR 210-20, Summary).

AR 210-20 (p 4) describes comprehensive planning as a framework of component plans that have the objective of providing an overall installation master plan. According to the regulation, comprehensive planning goes beyond the simple placement of buildings or maintenance of existing conditions maps to include all facilities programs and resources that aid installation management and development. All areas and activities affecting or affected by installation development and operations should be covered, including operational, physical, energy, social, aesthetic, economic, and ecc'logical factors.

The component plans address specific functions or programs and may be developed over time within the comprehensive planning framework. Examples of component plans relevant to environmental planning include the natural resource plan, environmental protection plan, land use plan, installation layout and vicinity, utilities plan, transportation plan, and energy plan. In all, AR 210-20 (pp 4-5) lists a total of 16 possible component plans (Table 1). According to AR 210-20, the component plans should be integrated into the overall installation master plan, and the master plan report should include a descriptive synopsis of each component plan.

According to AR 210-20, the installation master plan should include existing conditions maps, future development overlays, and component plans, in a narrative and graphic form that portrays the long-range installation development over a 20-year planning horizon. Objectives of the master plan are to guide growth and development in light of changing command goals, mission objectives, and policies. Accordingly, the installation master plan should provide:

**Table 1**

**Component Plans**

- 
- Natural Resources Plan
  - Environmental Protection Plan
  - Installation Layout and Vicinity
  - Land Use Plan
  - Airfield, Air and Range Operations
  - Installation Compatible Use Zone (ICUZ) Study
  - Utilities Plan
  - Communications Plan
  - Transportation Plan
  - Energy Plan
  - Installation Design Guidelines (optional)
  - Landscape Development Plan (optional)
  - Future Development Plan
  - Fire and Life Safety Protection Plan
  - Physical Security
  - Quality of Life Programs (optional)

1. Direction for future development
2. A framework for the component plans
3. An illustration of the interdependency between the master and component plans
4. A mechanism to relate the installation mission to facilities plans, programs, projects, and policies
5. A mechanism to relate the needs of the Army community to the surrounding community
6. A framework for preparing a 5-year plan, other construction programs, and major renovation and replacement projects
7. A mechanism to ensure that installation projects are appropriately sited (AR 210-20, p 6).

AR 210-20 identifies a number of "primary facilities development components" to be included in the master plan, including existing conditions maps, a land use plan, a transportation plan, a utilities plan, and a future development plan. The contents of each of these components is described in detail in the regulation. The land use plan includes a functional-relationships analysis and a future land-use plan, while the future development plan includes a facility-use survey, master-plan narrative, tabulation of existing and required facilities (TAB), and future development plan drawings (AR 210-20, pp 6-9).

From the future development plan drawings, a capital improvement program is derived, showing planned construction requirements over a 5-year period. The siting and programming of these facilities should be consistent with other components of the master plan, particularly the land use plan, and priorities are to be assigned according to master plan objectives (AR 210-20, p 9).

In addition to the documents identified above, special studies may be prepared when required to provide a detailed evaluation of some aspect of the installation or to make proposed planning recommendations. Examples of special studies include an historic preservation plan, architectural/design

controls, water quality management plan, etc. Area development plans may also be necessary for functional subareas of the installation, such as troop barracks or other complexes (AR 210-20, p 9).

AR 210-20 also addresses procedures for administration of master plan documents, intergovernmental review, and establishment of a planning board (AR 210-20, pp 5, 6, 10, 11). All required installation master plan documents are submitted to the appropriate Major Command (MACOM) for review and approval. Following installation review, but prior to MACOM review, the U.S. Army Corps of Engineers (USACE) division commander must make certain documents available to designated liaison representatives from other governmental agencies, in accordance with AR 210-70, *Intergovernmental Coordination of DOD Federal Development Programs and Activities*. The planning board is comprised of members representing the command, and operational, engineering, and planning interests of the installation. It acts on a wide range of comprehensive planning issues and advises the installation commander on priorities, future plans, amendments to the master plan, long-range policies, strategies, programs, and short-range development projects (AR 210-70, p 5).

This highly simplified summary of the master planning process is set forth in AR 210-20. However, AR 210-20 does not include a summary listing of master plan contents or a flow chart of the master planning process. While the regulation addresses different aspects of the master planning process, the process itself is not spelled out. As discussed below, the technical reports associated with AR 210-20 provide a more complete description of the master planning process. However, these guidelines predate the most recent version of AR 210-20 and are not consistent with the provisions of the regulation.

Figure 1 shows a flow diagram of the current master planning process as presented in AR 210-20. There are currently two areas where environmental considerations enter into the master plan: first, as the component plan ("Environmental Protection Plan") that must be summarized in the master plan; and second, as an Environmental Assessment (EA), which must be prepared as part of the future development plan the "Master Plan Narrative."

#### *Other Related Master Planning Documents*

There are a number of Army documents in the Technical Manual (TM) and Technical Bulletin (TB) series that provide technical support to AR 210-20. The most comprehensive of these is TM 5-803-1, *Installation Master Planning*. TM 5-803-1 provides specific guidance on the preparation of master plan reports. It addresses data collection and analysis, and preparation of concept plans, long-range plans, environmental assessments, future development site maps, and project phasing maps. Figure 2 shows the contents of a master plan report, as set forth by TM 5-803-1.

Figures 3 and 4 show flow charts of the master planning process (as discussed in TM 5-803-1) that present a more complete planning process than is outlined by AR 210-20 (Figure 1). Figure 3 shows how the process proceeds from the definition of program requirements, to data collection, to concept and plan development. As shown here, environmental assessment enters into the process only as an input to the concept plan and as a product of the completed master plan. Figure 4 shows the structure of the master plan report and its relation to the future development site map and the project phasing map. Again, environmental assessment is shown as a product of the long-range component of the master plan.

The current version of TM 5-803-1 is 5 years old; a comparison between Figure 1 with Figures 3 and 4 shows that TM 5-803-1 is inconsistent with the master planning process as currently outlined in AR 210-20. A major revision and updating of TM 5-803-1 will be necessary to make it consistent with the updated AR 210-20 regulations to maintain it as a detailed master plan preparation manual.

TB ENG 353, *Installation Master Plan Preparation* provides detailed guidance on preparation of master plan maps and the overlay mapping system, including detailed formatting requirements, standard legend symbols, and other specifications for existing conditions maps, future development plans, and mobilization development plans. Instructions are provided for a total of 44 different types of maps and

**INSTALLATION MASTER  
PLAN  
(0 - 20 Years;  
Update Every 5 years)**



**MASTER PLANNING GOALS**

- Establish Future Direction for Installation Development
- Manage Limited Resources
- Make Maximum Use of Existing Facilities
- Clearly Establish Command Goals and Objectives



**DATA INPUTS**

ASIP  
Force Structure Component System  
Army Modernization Information Memo  
ICUZ  
Army Range Master Plan  
Real Property Management Activity



**DEFINE BROAD DEVELOPMENT  
OBJECTIVES**



**ANALYSIS OF EXISTING  
CONDITIONS**



**INSTALLATION MASTER PLAN  
OBJECTIVES**

1. Present the composition of an installation.
2. Plan for the security and comprehensive long-range development to support its original mission over a period of about 20 years.
3. Guide growth and change in light of changing command goals, mission objectives, and policies.
4. Develop a logical sequencing process.



**EXISTING CONDITIONS MAPS**

Regional Context  
Airfield  
Installation Land Use  
Building Area Land Use  
Site Plan  
Transportation  
Utilities  
Storm Drainage

**Figure 1. AR 210-20 Master Plan Flow Chart.**

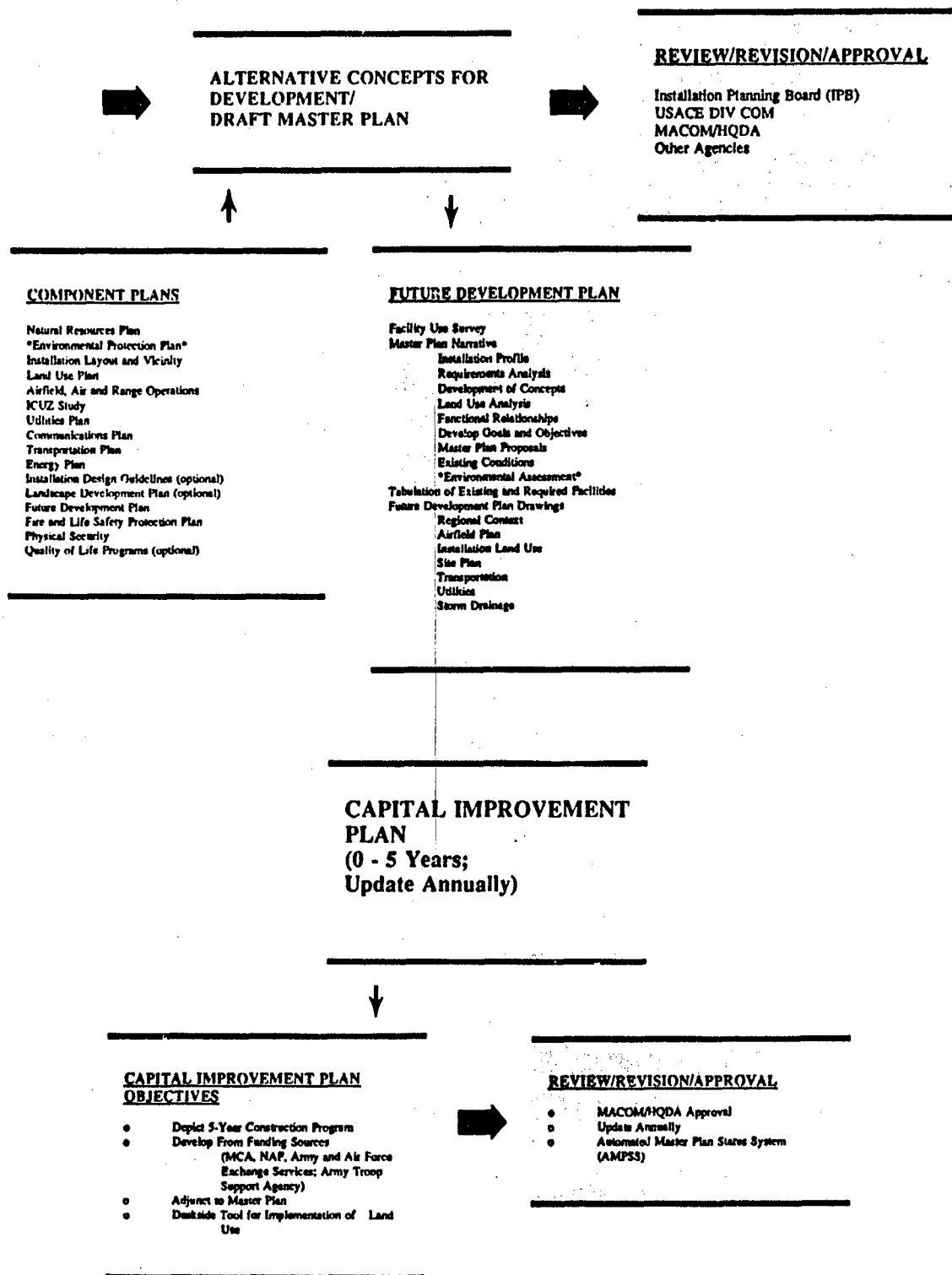


Figure 1. (Cont'd)



### A-1. General

This appendix provides an outline for the recommended contents of the Master Plan Report. The specific contents of each Master Plan Report should correspond to the items listed in this appendix but may be tailored to the individual requirements of the installation. The outline is to be used as a guideline in preparation of the Master Plan Report in conjunction with AR 210-20 which sets forth the policies, procedures, and responsibilities for the Army Master Planning Program.

### A-2. Exhibits

The Master Plan Report should include maps, diagrams, and charts when they will convey information necessary to present analyses or recommendations more clearly than text. The graphics prepared for the Master Plan Report should not duplicate maps or other materials already available. All graphics prepared for the Master Plan Report should be at a scale appropriate to the material presented. Those graphics showing on-post conditions or proposed development should be consistent in format and orientation to facilitate comparison of information. Exhibits which are required to be included in the Master Plan Report include the following:

- Regional Setting.
- Vicinity Map.
- Community Land Use.
- Existing Land Use Pattern.
- Existing Road Network.
- Buildable Areas.
- Concept Plan.
- Land Use Plan.
- Circulation Plan.
- Utility Service Plans, including as a minimum separate exhibits for the water system, sanitary sewer system, electrical distribution system, and gas system.

### A-3. Report Outline

The Master Plan Report will be a comprehensive document. The report narrative will include the following elements:

- a. Executive Summary.
  - (1) Authorization for and applicability of the Master Plan study.
  - (2) Summary of missions.

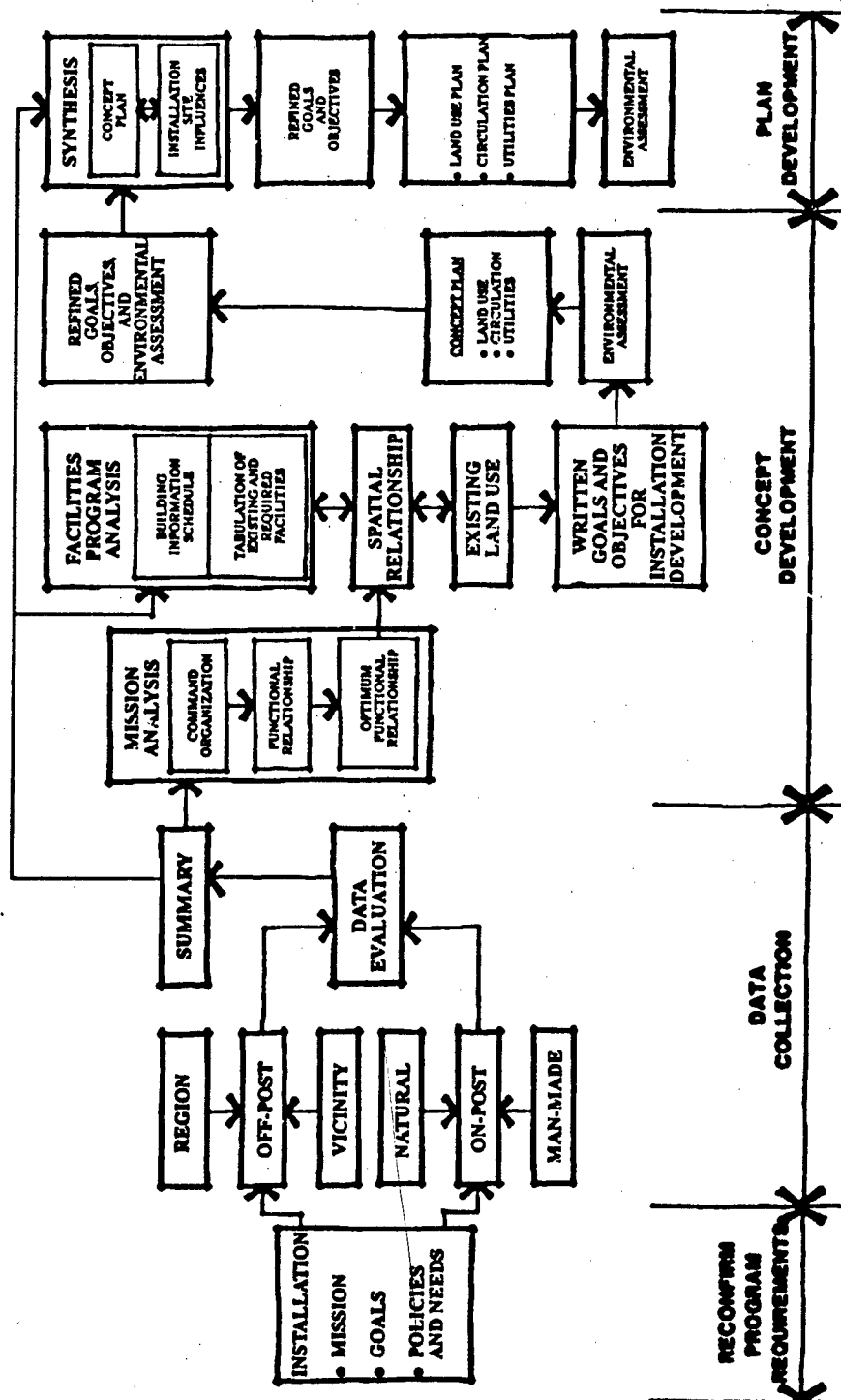
- (3) Summary of major development potentials and limitations.
- (4) Highlights and interaction of contributing plans.
- (5) Summary of major planning recommendations.
- b. Table of contents/list of tables, charts, and illustrations.
- c. Introduction
  - (1) Purpose and scope of the report.
  - (2) Summary of goals and planning objectives.
  - (3) Definition and planning assumptions.
  - (4) History, mission, and organization.
  - (5) Interface with higher HQs and other DOD agencies.
- d. Data Collection and analysis.
  - (1) Off-post infrastructure and community interface.
    - (a) Geographical location.
    - (b) Regional transportation system.
    - (c) Socioeconomic conditions.
    - (d) Community land use and planning.
    - (e) Community services.
    - (f) Land leases and easements.
    - (g) Federal support services.
  - (2) On-post data analysis.
    - (a) Natural environment.
      - 1. Geologic elements.
      - 2. Soil conditions.
      - 3. Topography.
      - 4. Hydrology.
      - 5. Vegetation and wildlife.
    - (b) Human environment.
      - 1. Historic/archeological setting.
      - 2. Current and forecasted demographics.
      - 3. Military community services.
      - 4. Outdoor ranges.
      - 5. Maneuver areas.

Source: TM 5-803-1, Installation Master Planning (DA, 13 June 1986), Appendix A.

Figure 2. TM 5-803-1 Contents of a Master Plan Report.

- (c) Safety and health.
  - 1. Air operations.
  - 2. Explosives storage and handling.
  - 3. Hazardous material.
  - 4. Electromagnetic safety.
  - 5. Radiation safety.
  - 6. Air quality.
  - 7. Noise environment.
  - 8. Water quality.
- (d) Land use/circulation/utilities relationships.
  - 1. Land use.
  - 2. Traffic circulation.
  - 3. Utilities.
- (3) Summary of limitations.
  - (a) Significant conditions.
  - (b) Buildable areas.
- (4) Mission analysis.
  - (a) Mission definition.
  - (b) Organizational structure.
  - (c) Planning strength.
  - (d) Functional relationships.
- e. Concept plans.
  - (1) Needs and constraints.
  - (2) Existing spatial relationships.
  - (3) Synthesis.
  - (4) Goals and objectives.
  - (5) Alternate concept plans.
  - (6) The Concept Plan.
    - (a) Land use element.
    - (b) Circulation element.
    - (c) Utility service element.
- f. Long-range plans.
  - (1) Plan considerations.
  - (2) Land Use Plan.
    - (a) Administration.
    - (b) Commercial services and community.
    - (c) Medical and dental.
- (d) Training.
- (e) Supply/storage and maintenance.
- (f) Manufacturing and production facilities.
- (g) Research, development, and testing.
- (h) Housing.
- (i) Operations.
- (j) Recreation.
- (k) Water areas.
- (l) Reserved land/buffer.
- (3) Circulation Plan.
  - (a) Primary roadways.
  - (b) Secondary roadways.
  - (c) Parking.
  - (d) Service access and parking.
  - (e) Installation access points.
  - (f) Pedestrians.
  - (g) Rail service.
  - (h) Water transportation.
- (4) Utility Service Plans.
  - (a) Sanitary sewer system.
  - (b) Water system.
  - (c) Electric power system.
  - (d) Solid waste.
  - (e) Storm drainage.
  - (f) Fuels, heating, and cooling.
  - (g) Communications system.
- g. Environmental assessment and finding.
- h. Appendix. Possible elements of the report appendix might include the following:
  - (1) Summary of Installation Visual Enhancement Study.
  - (2) Glossary of terms and abbreviations.
  - (3) Long, intermediate, and short-range construction programs.
  - (4) List of contributing plans and office or staff section responsible for each plan.
  - (5) Compendium of major Planning Board decisions (if required).

Figure 2. (Cont'd)



Source: TM 50803-1, *Installation Master Planning* (DA, 13 June 1986), Figure 1-2, p 1-2.

Figure 3. TM 5-803-1 Master Plan Process Flow Chart.

exhibits that may be contained in a master plan report. As with TM 5-803-1, TB ENG 353 will require a major revision to conform with the AR 210-20 update.

Other documents in the TM and TB series that address specific aspects of installation master planning are: TM 5-803-5, *Installation Design*, which is a good source of design guidelines for improving

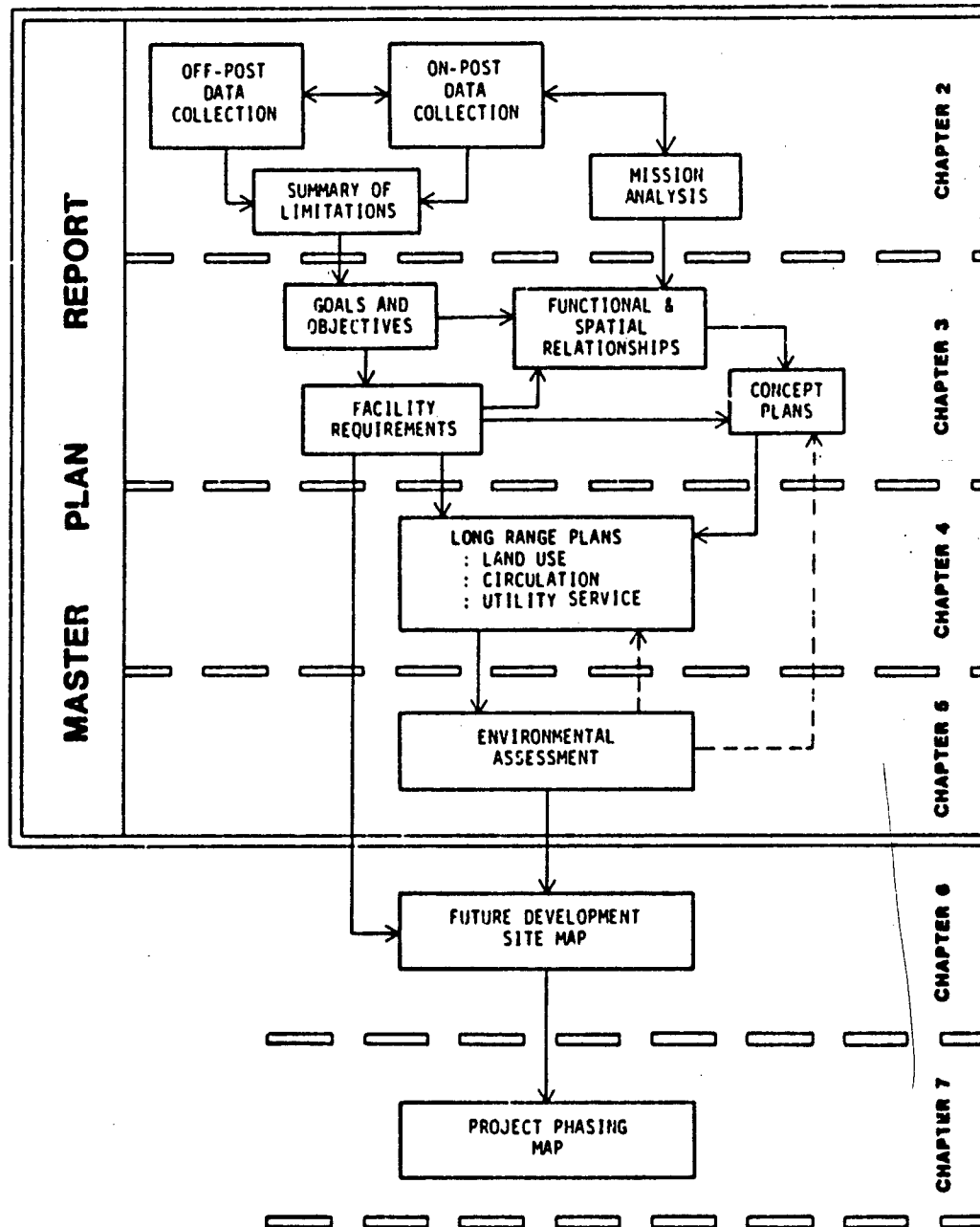


Figure 4. TM 5-803-1 Master Plan Contents Flow Chart.

the visual environment of Army installations; and TM 5-803-8, *Land Use Planning*, which specifically addresses the land use plan component of the master plan. Other more specific planning and project design guidelines are listed in the References section of this report.

Guidance for the preparation of the Environmental Quality Protection Plan component of an Army Installation Master Plan is provided by Engineer Technical Letter (ETL) 1110-3-407, which is discussed in the following chapter.

The Technical Letter emphasizes the importance of integrating the Environmental Quality Protection Plan component with the other Master Plan component plans through a series of feedback loops, incorporating new information and making refinements and changes for the benefit of the overall quality of the installation. However, the Technical Letter postdates AR 210-20 so that its guidance is not reflected in the regulation (see Chapter 3 for further discussion).

#### *AR 210-20 Problems and Concerns*

AR 210-20 does not show the exact relationship between the master plan report and the component plans, nor does it give clear guidance on the preferred sequencing of the various documents. As a result Army master planners are sometimes unsure how to appropriately time component plan preparation. Some advocate the preparation of these component plans as independent sources of input to the master plan, while others prefer to use the master plan as a source of direction and as a planning tool for preparation of the component plans (Headquarters, Training and Doctrine Command [HQTRADOC], 6 December 1990). AR 210-20 leaves the question of sequencing open to the master planners. Army master planners and environmental document preparers have also indicated that they are unsure of the appropriate point to prepare environmental documentation and whether these documents should attempt to cover the component plans as well as the master plan itself (HQTRADOC, 6 December 1990).

The lack of a clear master plan process and contents chart in AR 210-20 complicates this problem. Such charts are provided in the supporting documents of TM 5-803-1, TB ENG 353, and TM 5-803-8, but these charts (Figures 3 and 4) are neither consistent with the process as outlined in AR 210-20, nor are they consistent among themselves. These supporting documents need revision and update to conform with the regulations set forth in the latest version of AR 210-20.

The planning process as described in AR 210-20 is multilayered and complex. Creating and implementing 13 required component plans (and additional optional ones) can be unwieldy and time consuming. There is also a fair amount of redundancy in the planning process. For example, evaluation of the installation transportation system may occur in no fewer than five places throughout the master planning process: as a component plan, as an existing conditions map, as part of the master plan narrative of the future development plan, as a future development plan drawing, and as a special study. Then, the transportation system may again be examined as part of environmental review of the master plan. A streamlined planning process would consider the transportation system in only two ways: as it currently exists and as it is proposed. A technical report may be prepared as a background to the discussion, but would not itself be a part of the plan.

AR 210-20 does not identify specific goals for the installation master plan or even require that goals be defined as a first step in the planning process. It is important to recognize that mission accomplishment is the primary, non-negotiable goal of many base activities. The goals of environmental protection and compliance should also be emphasized. Establishing goals as part of a strong policy statement is essential for creating an effective installation master plan. While some installation master plans already contain policy statements, a policy setting component should be made an explicit regulatory requirement.

Unless a master plan is required to include goal setting, a concept plan, evaluation of alternatives, and preparation of a preferred plan and program, the installation master planning process (as regulated by AR 210-20) cannot be considered a "rational planning process." Here, "rational planning" is described

as a process in which the decisionmaker: (1) lists all of the opportunities for action open to him or her; (2) identifies all of the consequences which would follow from the adoption of each of the possible actions; and (3) selects the action that would be followed by the preferred set of consequences. For practical purposes, a rational decision is one in which alternatives and consequences are considered as fully as the decisionmaker, given the time and other resources available, can afford to consider. The concept of rational planning is distinctly opposed to the alternative of simply "muddling through"; yet, rational planning need not be a strict "blueprint" and can allow for flexibility (Banfield 1973). A master plan that is not required to follow the steps of a rational planning process cannot give master planners, reviewing agencies, and the public at large, a rational, documented basis for master planning decisions and may put decisionmakers at a disadvantage in defending master planning actions. This lack of a rational planning approach may also lead to a less than optimal arrangement of land uses, both in terms of installation needs and environmental sensitivity.

In response to these and other concerns, the Army master planning process was reviewed (Wheeler 1988) and an extensive revision of AR 210-20 is underway (discussed below).

#### *AR 210-20 Update*

Installation master planning under the current AR 210-20 has grown overly complex and may not follow the steps for a rational facilities planning process. Installation administrators and planners have complained about the expense and difficulty of maintaining the master plan with its many component plans and need for frequent updates. AR 210-20 is currently being updated to simplify the planning process and to reduce the expense and effort of plan implementation. At the same time, other goals of the update are to enhance environmental planning, increase environmental compliance, and account for mobilization requirements (DAEN-ZCI-P, Information Paper 17 April 1990, included in Appendix A of this report).

The AR 210-20 update is intended to restructure the master planning process into four components: (1) a long-range plan (zero to 30 years), describing general installation development and constraints on future development; (2) a short-range plan (zero to 6 years) based on The Army Plan (TAP) and project-specific needs; (3) a mobilization master plan, specifically addressing short- and long-term mission requirements; and (4) a capital investment strategy. The proposed master plan will include: land use and zoning designations, an environmental overlay, a general site plan, a transportation plan, a narrative with environmental analysis, a utilities analysis, an installation design guide, and a tabulation of existing and required facilities. The proposed environmental overlay will indicate environmentally sensitive areas, including wetlands, flood plains, landfills, hazardous and toxic materials areas, endangered species habitats, historical features, unique geographical features, etc. It is envisioned that the future development description will use a geographic information system (GIS) environmental data base, such as the Army's Geographic Resources Analysis Support System (GRASS) (DAEN-ZCI-P, Information Paper 17 April 1990).

The proposed long-range plan will be general in nature, requiring little update unless the installation's major mission changes. The proposed plan will indicate mission and population changes, capabilities analysis, and limiting factors such as environmental constraints and transportation implications. The long-range plan should also coordinate with and use the comprehensive plans of surrounding communities. According to an Information Paper on the update, use of the long-range plan will eliminate the need for the component plans and will help provide a stronger environmental basis for short-term and project planning (DAEN-ZCI-P, Information Paper 17 April 1990).

The short-range element is proposed to tie into the Army's Planning, Programming, Budgeting and Execution System (PPBES) cycle (AR 1-1), making the master plan an integral part of the construction,

revitalization, maintenance, and repair programming for the installation. The proposed short-range plan will be supported by the Real Property Planning and Analysis System (RPLANS) and will provide the basis for the annual update and submission of the installation's 5-year construction program. Under the proposed system, the short-range plan will help to bridge the current gap between installation master planning and construction programming and will better respond to the Army's current budgeting and programming cycle, and to ever-changing mobilization requirements.

The mobilization master plan is proposed to establish the most efficient use and orderly development of real property in response to assigned missions, functions, and tasks. It is to use information contained in both the long-range and the short-range plan and will consist of the following elements: narrative, land use depiction, mobilization tabulation of existing and required facilities, and mobilization site plans (DAEN-ZCI-P, Information Paper, 17 April 1990).

While the proposed AR 210-20 update will certainly help to simplify the master planning process and improve the connection between long-range planning and project construction and mobilization needs (as currently conceived), it may also result in the elimination of a necessary basic comprehensive approach to master planning. The Information Paper prepared on the AR 210-20 update emphasizes the "general" nature of the long-range plan and its reliance on the comprehensive plans of others. It also proposes increasing the planning horizon for the long-range plan from the current 20 years to 30 years, and emphasizes the reduction of update needs, since the plan would be based on general, relatively static information (DAEN-ZCI-P, Information Paper, 17 April 1990).

This proposed approach would result in a weakened planning basis and could endanger the firm foundation needed for strong, defensible implementation of sometimes controversial Army activities. In terms of environmental considerations, the lack of a basis for comprehensive planning and correspondingly comprehensive environmental impact document would be a step backward, in contradiction to the stated objective of the AR 210-20 update, which is to improve environmental compliance. Without this comprehensive basis, the installation master planner would lose the ability to "tier" off of a comprehensive master environment document and would have to spend more time preparing project-level plans and environmental documents. This *de facto* incremental approach to planning would further depart from rational planning decisions, overall environmental sensitivity, and consistent environmental compliance. Under an improved, rational approach, the master plan would be prepared as a comprehensive document that would form a strong basis from which to develop specific construction projects, respond to mission needs, and prepare environmental documents.

Preparation of a comprehensive (rather than general) long-range master plan is even more important, considering the extended planning horizon of 30 years. The extension of the planning horizon itself seems highly unrealistic in today's quickly changing Army installation framework; a more realistic projection would be the current 20-year horizon. It should also be emphasized that a planning horizon is just that: a look to the future with a "horizon" at the far end. It does not mean that the plan should be good for 30 years (or whatever the horizon is), or that it will not require updating until the horizon is reached. By its very nature, planning is a fluid, ongoing process, requiring frequent revision and update. The long-range horizon should represent a foreseeable series of construction cycles (e.g., some major projects may take 20 years to complete, from initial planning, to fund raising, to actual construction and occupancy) and should recognize the need for revision every 5 to 10 years, depending upon the rate of change.

The reliance on the comprehensive plans of surrounding communities is also unrealistic for several reasons. First of all, few states require communities to prepare comprehensive plans, and many of the communities in the largely rural areas where the majority of installations are located will not have a comprehensive plan. Second, even if there is an existing planning document for the area, it may be out-of-date or lacking in enough detail to be useful. In addition, communities are unlikely to include any evaluation of lands not in their control, such as Army installations. Finally, even if these communities have a recent, detailed plan that addresses Army installation lands, it is likely that the information will be presented in a way that would not be advantageous to the Army's planning perspective. Nonetheless,

coordination with (as opposed to reliance on) the existing comprehensive plans of surrounding communities is a good idea. The need for improved interagency coordination is discussed below under "Intergovernmental and Public Coordination."

In summary, while the AR 210-20 update is being undertaken, in part, as a reaction to the overwhelming workload of installation master planners in preparing the multilayered master plan documents, the proposed update may in fact weaken the comprehensive planning process. The current AR 210-20 process can be streamlined, made more effective, more environmentally responsive, and reduce the master planner's workload, while still retaining an all-important comprehensive planning basis. There is simply no cheap, easy way to undertake the Army master planning process as long as the Army wishes to uphold an ethic of rational decisionmaking, land stewardship, community sensitivity, and environmental compliance. A proposed master planning system that can achieve the AR 210-20's objectives, while still emphasizing a comprehensive basis, is presented in the section entitled "A Proposed Master Planning Process."

#### *TR N-88/16 Recommendations*

Prior to the currently ongoing revision of AR 210-20, USACERL undertook a review and analysis of the Army's master planning process (Wheeler 1988). This report notes many of the inconsistencies and problems with the Army master planning process that are identified above, includes a review of the literature on the comprehensive planning process, and sets forth a proposed land-use planning process, based on the process presented by F. Stuart Chapin and Edward J. Kaiser in the classic *Urban Land Use Planning* (Chapin 1979).

There are three phases in the proposed process: (1) gathering preliminary information; (2) preparing a conceptual development plan; and (3) siting land uses in conformity with the conceptual development plan. The first phase involves the creation of a data base to help planners make land use siting decisions. The data base should include various information maps, programmatic needs and demographic trends, and estimates and forecasts to assess the installation's current resources and to plan for the necessary land-use changes to remedy any shortcomings. The second phase involves developing a structural organization to guide long-range planning (i.e., 15 to 20 years) for the installation. It includes location of primary uses; assignment of land-use areas; planning for additional support facilities, utilities, and infrastructure required to meet future land use demands generated by the installation mission statement; and preparation of an official map showing all existing and proposed land uses, streets, and utilities, and depicting the protection of environmentally or culturally significant areas. The third phase involves a land-use siting review, amendment, and approval process based on civilian development review processes. There are three steps to the third phase: (1) submittal of proposal for a new land use or activity by proponents, (2) determination of land-use impact and conformance with the conceptual development plan by the Installation Planning Board (IPB), and (3) consideration of approval by the installation commander and the MACOM reviewers.

Specific recommendations contained in TR N-88/16 include: (1) creation of a standard installation land-use planning process, incorporating revisions to AR 210-20 and replacing conflicting or obsolete standards with state-of-the-art planning techniques; (2) compilation of references from the many related AR's and guidance documents into one user's guide, to become a single reference for installation master planners and MACOM reviewers; and (3) codification of the related ARs into a subject-indexed code that reflects a standard land-use planning process (Wheeler 1988).

#### **A Proposed Master Planning Process**

The proposed revisions to AR 210-20 and the recommendations contained in TR N-88/16 identify several ways to address current concerns and problems with the master planning process. However, a more comprehensive approach to restructuring the process can be undertaken to ensure that the Army is



better prepared to face the new challenges posed by the declining defense budget, Base Realignment and Closure (BRAC) activities, and increasing environmental awareness. In addition, as discussed above, the currently proposed AR 210-20 revisions may actually eliminate or reduce the effectiveness of this important comprehensive planning basis.

Potential changes to the master planning process should simplify and reduce requirements and increase flexibility. In this way, the master planning process can be made less expensive, easier to implement, and at the same time more applicable to mission planning and real property/facilities construction and management. Potential changes should also promote increased environmental sensitivity of master plans, and improve compliance with the National Environmental Policy Act (NEPA) and other environmental regulations.

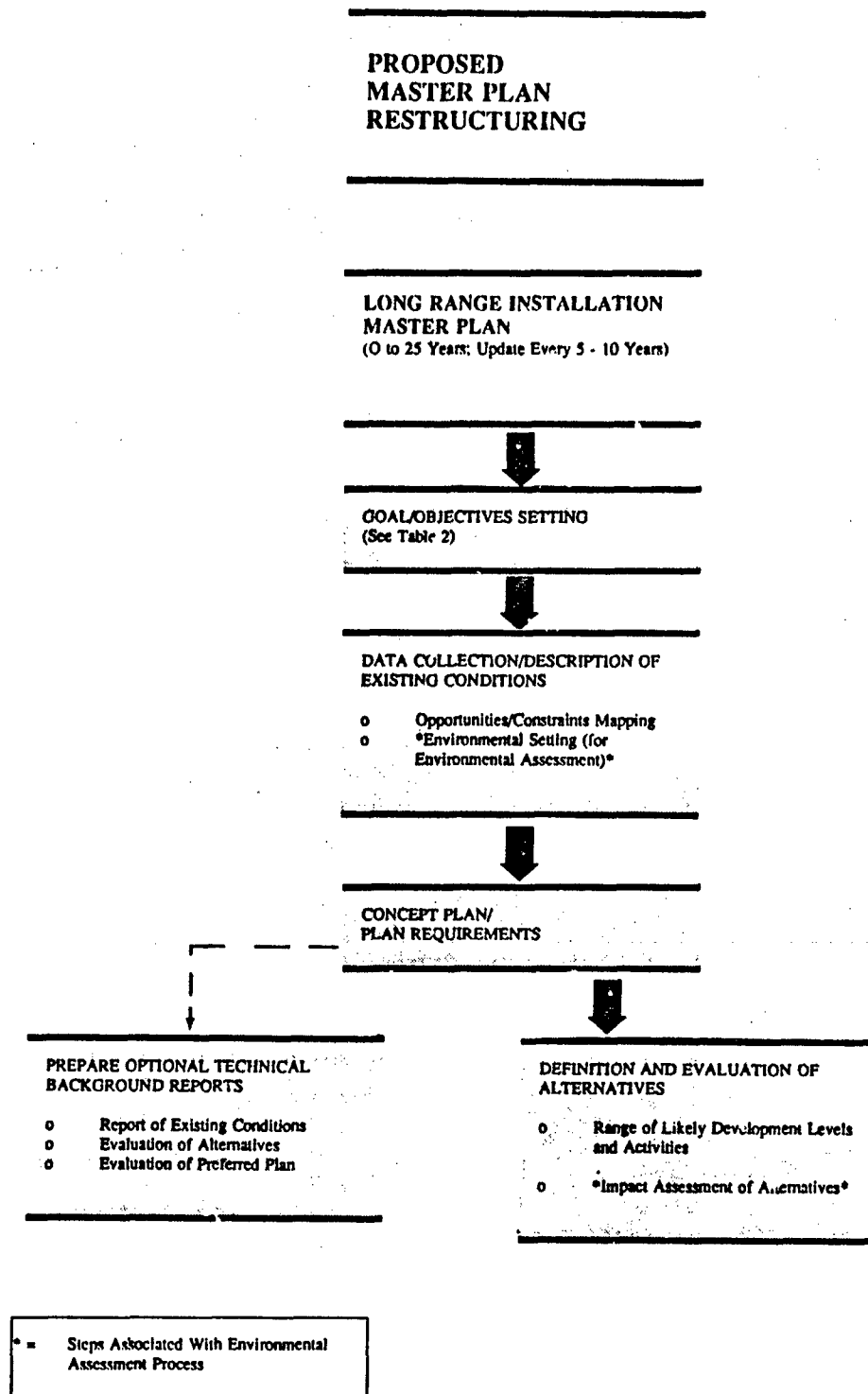
Figure 5 shows a proposed restructuring of the master planning process that addresses many of these concerns and more closely resembles the rational approach. Here, the process differs from the current master planning process by emphasizing the distinct phases of goal setting, data collection/description of existing conditions, concept plan/program requirements, definition and testing of alternatives, preferred plan development (at a more detailed level than for the alternatives), and implementation. The long-range master plan (from zero to 20 or 25 years) resulting from this can serve as a comprehensive basis for the subsequent development of short-range construction programming plans (zero to 5 years) and mobilization/mission plans (addressing both long- and short-term needs). Updates are recommended every 5 to 10 years for the long-range master plan and annually or as needed for the short-range construction programming and mobilization/mission plans.

The proposed process identifies goals and objectives as a first step in the master planning process, with all subsequent products based on this policy statement. In addition, it is recommended that AR 210-20 be revised to identify overall goals that may be used in preparing Army installation master plans. A list of proposed policy statements for incorporation into AR 210-20 is provided in Table 2.

An important tool prepared early in the proposed master planning process is an overall opportunities and constraints map for the installation, which can identify "red flags," or potential problem areas, as well as prime development/activity sites. By identifying and testing alternatives, the master plan can address a range of likely development and activity levels, thus providing a more flexible and useful basis for subsequent plan implementation. The preparation of component plans has been replaced by the preparation of optional technical background reports, prepared in two stages: first as a report of existing conditions, and second as an evaluation of the area of concern, *vis a vis* the conceptual master plan. The technical background reports provide input to the master plan, but are not actual components of the plan. The technical background reports are only prepared on those issues of most importance to the specific master-planning effort.

Assessment of alternatives as a preliminary step to selection of a preferred plan gives the opportunity to evaluate a full range of installation use possibilities, from peacetime scale-down to full mobilization. If properly assessed, this range can cover most, if not all, of the likely land use and activity changes occurring at the installation during the life of the Long-Range Plan.

As with the technical background reports, environmental assessment under this restructured approach occurs in two distinct phases: as a description of existing conditions ("environmental setting") and as an assessment of the impacts of preferred plan development ("impact assessment"). In addition, environmental assessment of the various plan alternatives can also occur as part of the master planning process, assisting in the selection of the preferred plan. Various implementation plans and activities may trigger further environmental documentation that is more focused than that completed for the master plan itself. This more focused assessment would use the master plan environmental document as a comprehensive basis, efficiently "tiering" off the larger document. Environmental assessment of the short-range master plan and the mobilization/mission plan could either be incorporated into the master plan environmental document, or be subject to more focused analyses, again, "tiering" off of the larger



**Figure 5. Proposed Master Plan Restructuring.**

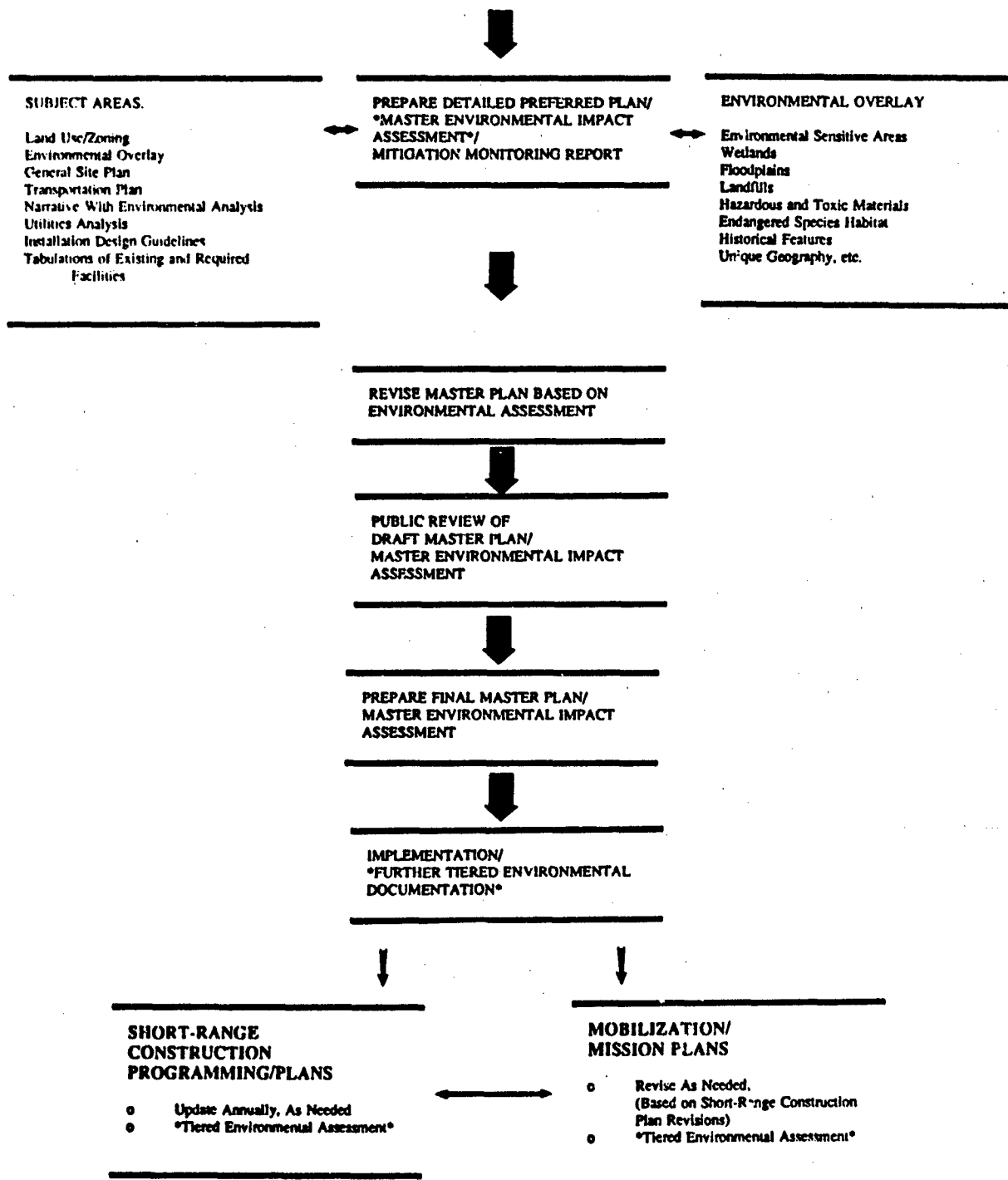


Figure 5. (Cont'd)

**Table 2**

**Proposed Master Planning Policy Statements**

- 
- Provide guidance for functionally efficient, economical, environmentally sensitive and aesthetically pleasing placement of uses and activities meeting the military requirements of the installation.
  - Support the Army's "Communities of Excellence" program in enhancing the installation environment as a live/work place.
  - Provide planning frameworks for both the long-range and the short-range, with emphasis on implementation strategies.
  - Consider and assess a range of use/activity alternatives to cover all reasonable scenarios.
  - Provide for short-term project planning that is consistent with the construction planning, programming, and budgeting process.
  - Account for mobilization and mission requirements, allowing sufficient flexibility for these ever-changing needs.
  - Consider maximum safety and public health in planning for facilities and uses such as air operations, explosives storage and handling, outdoor ranges, and hazardous materials use and storage.
  - Fully integrate environmental concerns and environmental impact assessment of uses and activities as part of the master planning process.
  - Minimize the impact of installation uses and activities on the natural, social, and cultural environment.
  - Encourage conservation and wise stewardship of natural resources.
  - Encourage coordination with surrounding communities and sensitivity to community concerns.
  - Provide for the implementation of environmental restoration needs, where needed.
  - Consider the potential for future civilian uses that may occur at the installation.
  - Develop an accurate audit trail for all planning and construction decisions.

document. This would depend on the timing of preparation and implementation of the three master plan components. (Chapter 4, "Integration of Environmental and Master Planning" [p 46] discusses this further).

The proposed master plan approach adopts many of the elements recommended by the proposed AR 210-20 update and by TR N-88/16, but with several additions and changes. It incorporates three of the master planning elements recommended by the AR 210-20 update (i.e., the long-range plan, short-range plan, and mobilization/mission plan), but expands the scope and utility of the long-range plan to act as

a comprehensive basis for the other two plan elements. It also incorporates a rational planning approach to preparation of the long-range plan. (The rational approach can also be used in preparing the short-range and mobilization/mission plan elements, but its use is less crucial here than for the long-range plan). Like the AR 210/20 update, the process proposed here eliminates the component plan requirement and streamlines the number and sequencing of the steps towards master plan preparation.

The planning process proposed here (Figure 5) is relatively consistent with that set forth in TR N-88/16, with some important differences. Like the TR N-88/16 process, the process proposed here is based

on the rational planning process. However, the process proposed here is broken down into more steps than are discussed in TR N-88/16, with the addition of an alternatives testing and evaluation stage prior to selection of a preferred master plan. The process proposed here also takes the master plan down to a more detailed level (i.e., the detailed development plan versus the conceptual plan) prior to adoption and implementation. In addition, the proposed process allows for early integration of environmental concerns and subsequent revision of the plan based on environmental concerns, concepts that are discussed further in Chapter 4.

### **Project Level Planning Documents**

Development of installation lands (i.e., planning at the construction project level) is governed by its own set of regulations and manuals. These encompass program development (AR 415-15), design approval (AR 415-20), and implementation (AR 415-10). Also in use as interim guidelines is the Chief of Engineer's *Architectural and Engineering Instructions: Design Criteria* (HQUSACE 14 July 1989). At a more detailed level, TM 5-800-3, *Project Development Brochure*, provides forms for the development and recording of data necessary to program, budget, and initiate design of proposed construction projects.

As discussed in USACERL's TR N-88/16, there is little connection made between the various land development documents and the master planning regulations. AR 210-20 is identified only by cross-reference and there is no procedure established for considering the master plan when implementing construction projects. As with the regulations and guidelines governing master planning, the project development regulations are not organized in a cohesive and consistent fashion. This leads to a selective approach to project planning, where design professionals may apply only those regulations and guidelines suiting their goals, without reference to the installation master plan or the needs of other design professionals. With a lack of strong interdisciplinary coordination among planning and design professionals, the project planning process can become fragmented and far removed from the overall planned needs of the installation.

The AR 210-20 update's emphasis on short-range planning and connection to the PPBES cycle should help bridge the gap between installation master planning and actual construction. In addition, as with the master planning regulations and technical manuals, a comprehensive updating and revision for consistency and improved integration is needed for the project-level planning documents. Consistency and quality in design approaches may be achieved through reference to TM 5-803-5, *Installation Design*, and, if available, to the design guidelines component plan of the installation master plan.

### **Intergovernmental and Public Coordination**

Coordination with other federal, state, regional and local agencies during the installation master planning process is addressed by AR 210-20 and by AR 210-70, *Intergovernmental Coordination of DOD Federal Development Programs and Activities*. According to AR 210-70, it is the policy of the Department of Defense (DOD) to:

promote an intergovernmental partnership and a strengthened federalism by relying on state processes and on state, areawide, regional, and local coordination for review of proposed DOD federal development; and to encourage the opportunity to review other agency programs and activities that may affect the Department of Defense (AR 210-70, p 11).

Elements of the Army are directed to set up and maintain an intergovernmental coordination management process to achieve full consultation with state, regional, and local authorities for specified DOD programs and activities. These programs and activities include: installation master planning; military construction; family housing; real property acquisition and disposal; withdrawal of public domain land for military use; substantial changes in existing use of installations; NEPA documents; Air Installation

Compatible Use Zone (AICUZ) studies; natural resource plans; floodplain management and wetlands protection; and information/data relevant to regional plans, programs, and projects (AR 210-20, p 3).

According to AR 210-20, the USACE division commander must make master planning documents available to representatives of other affected agencies. This review is to occur following internal installation review, but prior to review and approval by the Major Command (MACOM) or Headquarters, Department of the Army (HQDA) to allow for revision based on these agencies' comments. Significant changes to the installation master plan shall also be submitted for review (AR 210-70, p 2).

This coordination shall use the state's established clearinghouse process, which facilitates the provision of official state, regional, and local agency views on proposed DOD (and other federal) actions. Coordination for review of installation planning and other Army projects helps encourage reciprocal review, by which these state, regional, and local agencies will coordinate their planning efforts with the Army (AR 210-70, p 3). AR 210-70 includes a sample Memorandum of Understanding (MOU) form for use in preparing agreements with other agencies and levels of government. Thus far, close coordination with other agencies and with the concerned public has been most notable through the NEPA environmental review process and through the AICUZ studies, which may often be adopted as a part of the affected communities' comprehensive plan.

Continued and improved coordination with other levels of government and with the public at large has grown increasingly important as the Army's BRAC program proceeds and as the concern for environmental sensitivity grows. The BRAC program has led to new opportunities for public agency partnerships, and even public/private partnerships, to address future uses of Army lands. The proposed streamlining of the installation master planning process and improved integration of the environmental planning/assessment process into the master planning process will help to make installation master plans more accessible, understandable, and useful to other affected agencies and the concerned public.

Improvement of the coordination and review process with other agencies and the public could also be enhanced through limited representation on the Installation Planning Board (IPB) by other agency liaisons and/or representatives of the surrounding community. This would allow for more frequent, informal consultation from these other parties in relation to installation planning activities. To protect the need for self-determination, and in some cases, controlled access information, such representation could be on a nonvoting basis and/or only as provided for in special meetings. An additional concept is the conduct of special joint public meetings of the planning or governing body of the surrounding community (e.g., a Planning Commission or City Council) and the IPB to discuss issues of joint planning concern in a public forum.

A comprehensive, program-level environmental document should be prepared for the long-range installation master plan. The public review process associated with this document will enable other agencies and the public to address their overall concerns regarding the installation master plan. Then, as subsequent environmental review documents are "tiered" off of the program-level document to address short-range capital improvement plans, mobilization plans, and specific construction projects, the public will again have opportunity to address more specific concerns regarding installation planning and activities.

### **Summary of Concerns**

Although there are many fine individual regulations and guidelines addressing installation master planning, these regulations, as a whole, have become inconsistent and unnecessarily complex. There is a lack of clear policy direction for the preparation of master plans; and the current planning process does not resemble a rational facilities planning approach. Installation master plans are expensive to prepare and update, inconsistently prepared, and not responsive to goals such as meeting mobilization needs and achieving environmental protection. This lack of clear direction on the applicability of the regulations and an inconsistency among regulations, has resulted in a tendency for installation master planners to select

only regulations they wish to apply. This selective approach has led to a lack of conformity in the content and format of master plans.

An extensive revision of the primary regulation addressing installation master planning (AR 210-20) is currently underway. The update envisions the preparation of four basic elements in the master planning process: (1) a long-range plan; (2) a short-range plan tied to construction planning; (3) a mobilization master plan; and (4) a capital investment strategy. However, the update of AR 210-20 also eliminates a comprehensive underpinning for installation master plans. This report recommends that AR 210-20 be revised based on a rational planning process with the ability to more fully integrate environmental planning and assessment as part of the master planning process. In addition, revision of other relevant guidelines will be necessary to ensure that installation master planners understand and implement the new approach. Additional recommendations are made here to enhance coordination with other governmental agencies and with the public at large.

### **Recommendations**

As discussed in the sections above, there are several means by which the Army's master planning process can be made more effective, easier to understand and implement, and more responsive to environmental concerns and mobilization requirements:

#### **1. Simplify and Streamline the Master Planning Process.**

The master planning process as set forth in AR 210-20 has grown too complex. The revised process shown in Figure 5 would simplify and streamline the planning process by eliminating redundant analysis, eliminating the requirement for component plans, and clarifying the sequencing of the master plan tasks.

#### **2. Require Master Plans to Follow a Clear Policy Direction.**

Goals and objectives should be identified as a first step in the master planning process, with all subsequent products based on this policy statement. In addition, AR 210-20 should identify overall goals for all Army installation master plans. A potential listing of overall goals is provided in Table 2.

#### **3. Revise the Master Planning Process To More Closely Follow the Rational Planning Approach.**

The master planning process (as set forth in the current AR 210-20) has grown far removed from the rational planning approach as typically applied to facilities planning. Application of a rational approach—involving a clear process from definition of goals and objectives, to concept plan preparation, to evaluation of alternatives, to preparation of a preferred plan and program, to implementation—would help to provide a solid, defensible basis for installation planning and construction decisions.

#### **4. Address a Range of Activities and Uses.**

To improve the usefulness and flexibility of master plans, a range of types and intensities of activities and uses should be addressed so as to encompass any likely development scenario.

#### **5. Provide for Improved Integration of Environmental Planning/Assessment.**

Environmental constraints should be identified as one of the first steps in the master planning process and a preliminary evaluation of potential environmental impacts should be conducted early enough for the master plan to be revised to achieve greater environmental sensitivity. As discussed in Chapter 4, the environmental assessment document should be prepared simultaneously with the master plan in an iterative fashion to improve the integration of the master planning and environmental planning processes. A comprehensive "program" level environmental document should be prepared on the master plan itself,

allowing for the "tiering" of more focused environmental documents to address specific projects or plan changes.

6. Provide for an Improved Connection Between Master Planning and Project Construction.

Preparation of a short-range element of the master plan (zero to 5 years) that is tied to the Army's PPBES cycle will improve the connection between master planning efforts and actual project implementation.

7. Make Mobilization/Mission Planning a More Integral Part of Master Planning.

Preparation of a mobilization plan as an element of the master plan will help to account for important mission/mobilization needs through the master planning process.

8. Update Regulations Consistent with the Recommendations Above.

The primary master planning regulations and guidelines (AR 210-20, TM 5-803-1, TM 5-803-5, TM 5-803-8) should be revised to reflect these recommendations. This will require extensive revision of the basic regulation, AR 210-20, along with corresponding revisions to the associated technical manuals. In addition, the various project planning regulations and guidelines should be revised to reflect the recommended short-term master plan element. Preparation of a model master plan based on the revised regulations would be a useful tool.

One problem with the current set of master planning regulations and guidelines is a lack of internal consistency. Through these revisions, the guidelines should be made entirely consistent with AR 210-20 and with each other. In addition, the regulations and guidelines should clarify their applicability and should cross-reference each other.

9. Develop a User's Guidebook to the Relevant Master Planning Regulations, Guidelines, and Information Sources.

To clarify the relevance and applicability of the various master planning regulations and guidelines, a user's guidebook should be developed. This guidebook should identify the importance of each of the relevant regulations and guidelines and should direct the user to the appropriate document and citation for any given need (e.g., map preparation, mobilization planning, etc.).

10. Improve Master Planning Funding Sources.

Funding resources for master planning and associated environmental review efforts should be increased if for no other reason than good, solid planning will result in cost savings during construction and mission accomplishment, and also avoid the need for environmental restoration. Increased funding for the preparation of the mobilization/mission master plan element should be available from mobilization funding sources. Similarly, construction funds should be applicable to short-term master planning.

11. Improve Internal Coordination.

During the master planning process, coordination and communication should be improved among all involved planning and design professionals. This should be facilitated by the increased emphasis on project-level planning as part of the short-term master plan and through the clarification and revision of the relevant regulations and guidelines. Special training should be considered to help the involved professionals better understand the needs and work of the other involved fields.



**12. Improve External Coordination With Other Agencies and Surrounding Communities.**

To improve coordination of the master planning efforts with other agencies and the interested public, consider the addition of surrounding community representatives to the Installation Planning Board, as nonvoting members. Special Installation Planning Board meetings could also be held as community forums.

**13. Increase Frequency of Installation Planning Board Meetings.**

To improve both internal and external coordination during the master planning process, Installation Planning Board meetings should be held at least quarterly, rather than the currently mandated semi-annual frequency. During actual preparation of a master plan involving significant changes, the plan preparation committee of the Installation Planning Board should consider meeting monthly.

### 3 THE ENVIRONMENTAL PLANNING/ASSESSMENT PROCESS

The Department of the Army will endeavor to ensure the wise use of natural resources on Army land. The Department of the Army will match military mission activities with the ecological compatibility of the land and natural resources in order to maintain resources for realistic training, while minimizing the adverse impact on the human and natural environment. Decisionmakers will be cognizant of, and responsible for, the impact of their decisions on cultural resources; soils, forests, rangelands, water and air quality, and fish and wildlife; as well as other natural resources under their stewardship . . . . The Department of the Army will employ all practicable means, consistent with other essential considerations of national policy to minimize or avoid adverse environmental consequences and attain the goals and objectives [of the] National Environmental Policy Act (AR 200-2 Sect. 1-5).

#### Environmental Planning and Assessment Regulations/Guidelines

"Environmental planning" is a broad term that encompasses all planning activities that relate to or specifically consider the environment. Here, the "environment" may be defined to include such physical factors as erosion control, geologic hazards, hydrology and drainage, biological resources, air quality, noise levels, cultural resources, the visual environment, and hazardous materials.

The term "environmental assessment," as used in this report, relates specifically to the definition and assessment of impacts upon the environment that may occur from a given action, as mandated by NEPA. Environmental documents prepared under NEPA that assess these impacts include both EAs and EISs. The NEPA process is sometimes referred to as the "environmental review process" or "environmental documentation." "Environmental assessment" is a more specific term that fits within the broader concept of "environmental planning."

Guidance for the environmental planning and assessment of Army actions, including installation master plan preparation, is provided by a number of regulations, technical reports, and memoranda. Two explicit areas where environmental considerations enter into the installation master planning process are: as a component plan (also known as the Environmental Quality Protection Plan), which must be summarized in the master plan; and as an Environmental Assessment, which must be prepared as part of the future development plan, master plan narrative (these points are indicated by asterisks in Figure 1).

#### *AR 200-1, Environmental Protection and Enhancement*

There are many environmental protection laws that address the various aspects of the environment and that apply to Army actions. AR 200-1 provides a comprehensive listing of these laws, their applicability to the Army, programs for implementation, and assigned responsibilities for ensuring compliance. Among the programs addressed by AR 200-1 are: research and development, water resources management, air pollution abatement, hazardous materials and waste management, solid waste, noise abatement, emergency response, environmental restoration, asbestos management, radon reduction, environmental baseline studies, threatened and endangered species, historic preservation, and environmental compliance and auditing.

Most of the programs specified in AR 200-1 are more relevant to ongoing Army activities and specific construction projects than to installation master planning. Required programs that do affect installation master planning include the Installation Restoration Program (IRP), which addresses remedial actions for land restoration; the Environmental Baseline Study (EBS), which is required for all real property transactions, and the Natural Resource Management Program. The purpose of the EBS is to describe the environmental setting; define the nature, magnitude, and extent of any environmental

contamination; and to develop sufficient information to adequately assess the health and ecological risks associated with the proposed real property transaction (AR 200-1).

#### *AR 200-2, Environmental Effects of Army Actions*

The mandate for reviewing environmental consequences of Army actions is provided by the landmark National Environmental Policy Act, adopted in 1969 and subsequently amended (title 42 U.S. Code). NEPA declared a national policy to encourage productive and enjoyable harmony between people and their environment; to establish efforts that will prevent or eliminate damage to the environment and biosphere, and stimulate the health and welfare of people; and to enrich the understanding of the ecological systems and natural resources important to the nation (NEPA, Sect. 2).

In addition to establishing a Council on Environmental Quality (CEQ), NEPA required that a detailed five-point statement be prepared regarding the potential environmental impact for any major Federal action significantly affecting the quality of the human environment. These five points include:

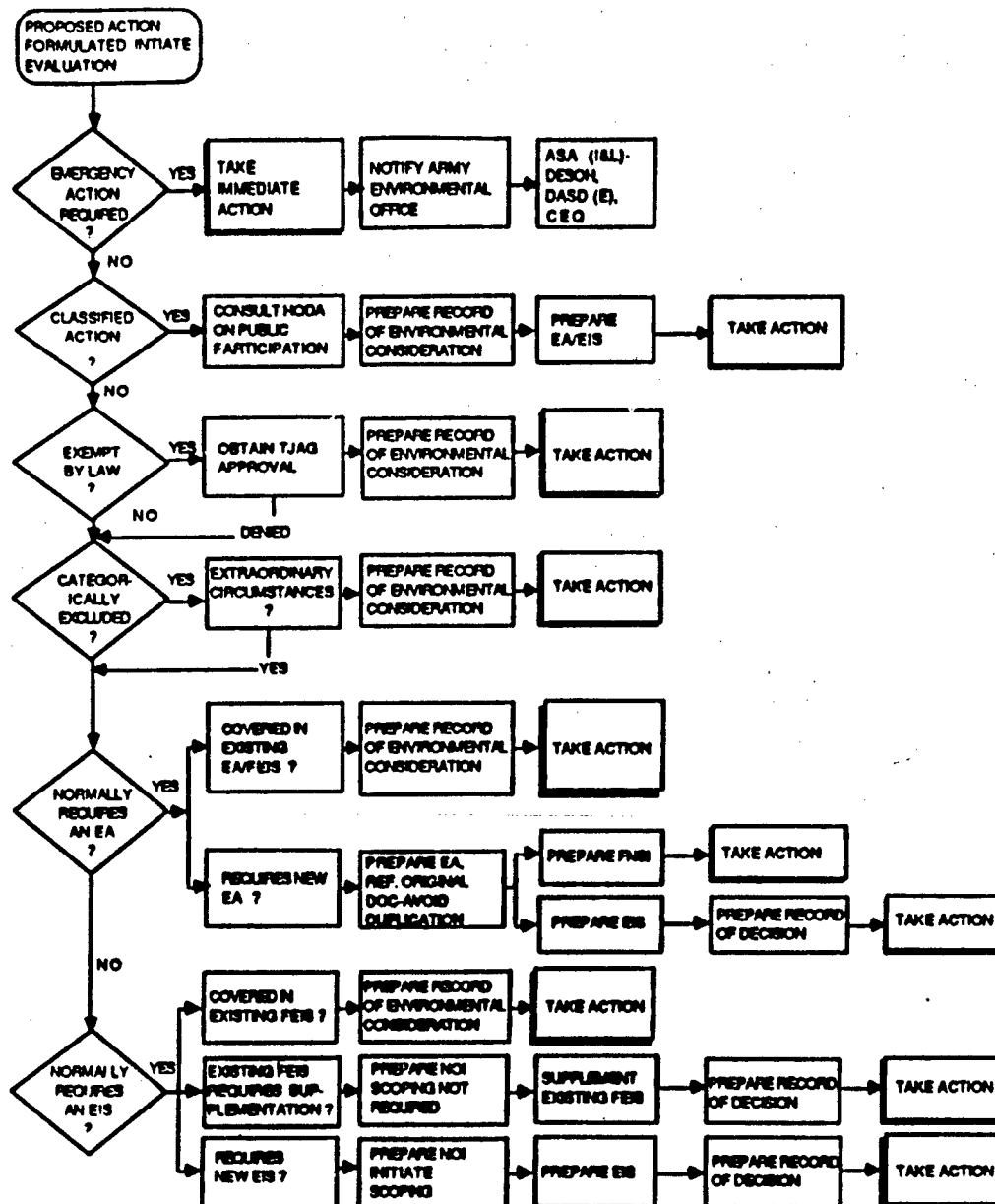
1. The environmental impact of the proposed action
2. Any adverse environmental effects that cannot be avoided should the proposal be implemented
3. Alternatives to the proposed action
4. The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity
5. Any irreversible and irretrievable commitments of resources that would be involved in the proposed action should it be implemented (NEPA, Sect. 102[C]).

Regulations for such statements and the other provisions of NEPA were prepared by the CEQ (title 40, Code of Federal Regulations); these regulations gave rise to the environmental review process as it is currently undertaken by all Federal and many state agencies.

Drawing from the CEQ Regulations, the Army has prepared its own set of regulations dealing with environmental review of Army projects: AR 200-2, *Environmental Effects of Army Actions* (AR 200-2). AR 200-2 sets forth policy direction, responsibilities, and procedures for assessment of environmental impacts and for integration of environmental considerations into Army planning and decisionmaking. According to AR 200-2, actions requiring environmental review include: policies, regulations, and procedures (e.g., an installation master plan); certain management and operational programs; construction projects; and certain other activities (AR 200-2, Sect. 2-2).

In brief, environmental review categories include exemptions from review, emergencies precluding review, Categorical Exclusions (CX), and Environmental Assessments (EA), which may be followed either by a Finding of No Significant Impact (FNSI) or by an Environmental Impact Statement (EIS). (Note that the preparation of an EIS does not necessarily require prior preparation of an EA [AR 200-2, Sect. 2-3].) Figure 6 shows the process of determining and preparing the appropriate environmental document.

An EA is an abbreviated environmental review document, prepared when an action has the potential for cumulative impact on the environment, environmental pollution, or some harm to culturally or ecologically sensitive areas. Required contents of an EA include: description of the proposed action; purpose of and need for the proposed action; discussion of the alternatives considered; description of the affected environment; assessment of the environmental consequences; and a conclusion as to whether the



Source: AR 200-2, Figure 2-1.

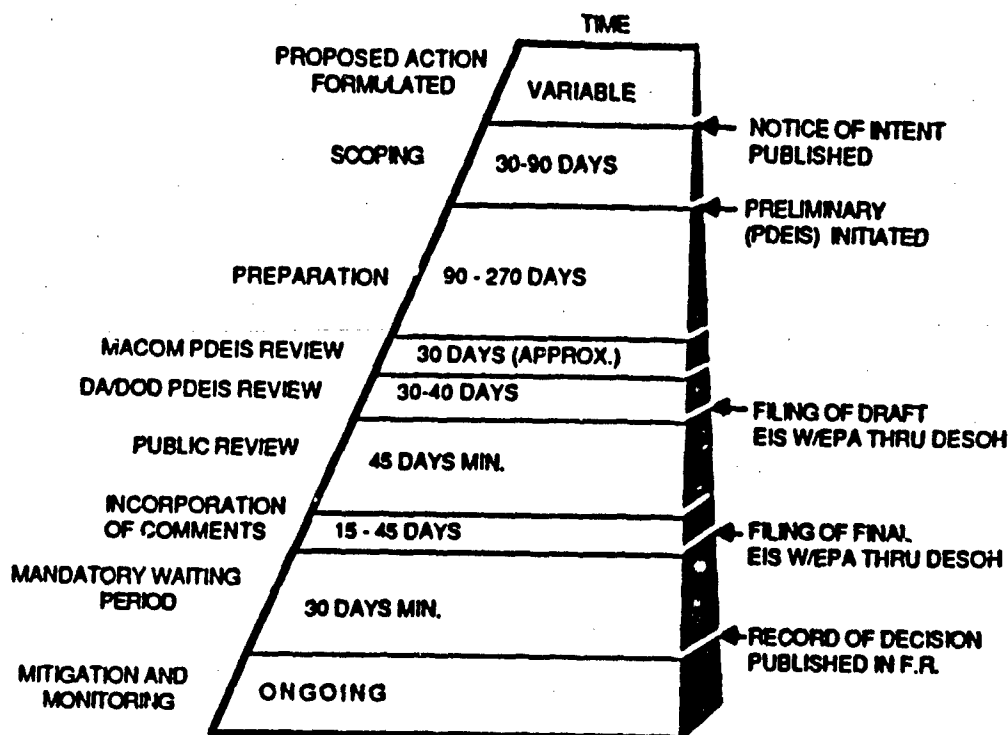
Figure 6. Environmental Review Process.

environmental impacts are significant (AR 200-2, Sect. 5-4). Development of an installation master plan is listed in AR 200-2 as an action that normally would require an EA (AR 200-2, Sect. 5-3[j]).

An EIS is required if an EA concludes that the environmental impacts of a proposed action are significant and/or if the proposed action has the potential to: significantly affect environmental quality, public health and safety, or cultural or ecological resources; result in potentially significant and uncertain environmental effects or risks; establish a precedent that could lead to future significant environmental effects; or result in cumulatively significant impacts (AR 200-2, Sect. 6-2). Similar to the content requirements of an EA, an EIS must discuss the purpose of and need for the action, the alternatives considered, the affected environment, and the environmental and socioeconomic consequences of the action (AR 200-2, Sect. 6-4). Actions normally requiring an EIS include significant expansion of a military facility; land acquisition, leasing, or other actions that may lead to significant changes in land use; and major changes in the mission of facilities that could cause significant environmental impact (AR 200-2, Sect. 6-3). Figure 7 shows the steps involved and typical time needed to prepare and process an EIS.

*ETL 1110-3-407, Environmental Quality Protection Planning*

Guidance for the preparation of the Environmental Quality Protection Plan component of an Army Installation Master Plan (see Figure 1) is provided by Engineer Technical Letter (ETL) 1110-3-407 (ETL 1110-3-407). The Technical Letter is intended as interim guidance, prior to permanent publication, and is not referenced in the Army Master Planning Regulation, AR 210-20, since it postdates the regulation.



Source: AR 200-2, Figure 2-2.

**Figure 7. Environmental Impact Statement Process and Time Requirements.**

The stated purpose of ETL 1110-3-407 is to provide the installation planner with a framework for defining and then incorporating environmental quality considerations into the development of long-term installation master plans and of short-term design and construction programs (ETL 1110-3-407, p 1-1). It includes instructions on preparing an environmental quality inventory (including both on-site conditions as well as external regulations and considerations); assessment of opportunities and constraints; forecasting and analysis of future impacts; determination of alternatives; and implementation and monitoring to achieve environmental quality goals.

According to ETL 1110-3-407:

... the major thrust of environmental quality protection planning is pollution control and the prevention of potential environmental impacts before they occur ... The planner must realistically assess mission requirements and devise development alternatives that eliminate pollution where it can be eliminated and minimize pollution where its prevention is not possible ... Environmental quality protection planning identifies existing conditions, problems, and potential sources/generators of pollution in the air, water, and on land. Alternative approaches and possible solutions are evaluated and implementation measures identified in order to achieve and/or maintain compliance with environmental regulations. (ETL 1110-3-407, p 1-5)

The process for preparation of the Environmental Quality Protection Plan takes a similar rational approach to that introduced in Chapter 2 for the master planning process as a whole. First, the environmental quality goals and objectives of the installation are defined, an inventory is made of environmental issues and problems and of future mission and land use requirements, and a profile of external forces is developed. Next, in the evaluation stage, concepts are identified for meeting the objectives of the plan, these concepts are evaluated against a set of opportunities and constraints, and a series of feasible alternatives is developed. Finally, detailed programs, policies, and projects are developed to implement a selected alternative; proposals are incorporated into the component plan; implementation is coordinated; and the progress of the project actions are monitored and adjusted accordingly to best meet the Plan's objectives. The Technical Letter notes that the steps in this process are not sharply separated and the process is iterative. A continuous feedback loop is required to reassess the validity of decisions made early in the process and to introduce new understandings of the planning issues (ETL 1110-3-407, pp 1-13 to 1-15).

ETL 1110-3-407 emphasizes the importance of integrating the Environmental Quality Protection Plan component with the other Master Plan component plans through a series of feedback loops, incorporating new information and making refinements and changes for the benefit of the overall quality of the installation. The Technical Letter notes that the Natural Resources, Land Use, and Utilities component plans, in particular, must reflect environmental quality protection concerns. Likewise, the Environmental Quality Protection Plan must reflect mission-generated requirements and the installation's future needs as reflected in these other component plans (ETL 1110-3-407, pp 1-6 to 1-8). Early incorporation is also emphasized: "Environmental quality protection planning must be included in the comprehensive planning process as early as possible to assure its timely influence and effectiveness" (ETL 1110-3-407, p 1-6).

The Technical Letter notes that the Environmental Quality Protection Plan can serve as the basis for determining the appropriate level of NEPA documentation. In addition, incorporation of the Environmental Quality Environment Plan recommendations into the master plan will ease implementation of NEPA and other environmental requirements. Because there will be some overlap in the preparation of the Environmental Quality Protection Plan and the NEPA process, ETL 1110-3-407 recommends that installations prepare an installation-wide NEPA document concurrent with the component plan. An important by-product of this level of analysis is "tiering," whereby general matters are covered in broader environmental impact statements. Subsequently, narrower statements focus on more specific actions,

"incorporate by reference" the general discussions, and concentrate on the issues specific to the later assessment (ETL 1110-3-407, pp 1-9 to 1-10).

Under the restructured master planning process discussed in this report, the component plans, including the Environmental Quality Protection Plan, would be eliminated to streamline the planning process. However, the master plan itself would be more comprehensive and would include increased discussion and consideration of environmental concerns. The environmental elements of the master plan would be improved through concurrent environmental assessment (in fulfillment of NEPA requirements). So far, the valuable direction contained in ETL 1110-3-407 has not been reflected in the Army's master planning regulation, AR 210-20. The currently ongoing revision of AR 210-20 provides an opportunity for the incorporation of relevant aspects of this Technical Letter.

#### *Other Environmental Planning Guidelines*

In addition to AR 200-1, AR 200-2, and ETL 1110-3-407, a number of other Army technical documents give guidance to the environmental assessment process and to the evaluation of particular types of impacts. A comprehensive source for environmental document preparation is USACERL's Technical Report (TR) N-130, *Procedures for Environmental Impact Analysis and Planning* (Fittipaldi 1982). This report is designed as a handbook to help Army personnel comply with NEPA and Army environmental review regulations, to perform environmental analysis, and to prepare environmental documents. The report identifies the requirements for planning, scoping, scheduling, public involvement, preparation of environmental documents, and identification of mitigation and monitoring techniques. The most commonly used environmental analysis methods are described and evaluated and specific guidance is provided for the writing of EAs and EISs.

USACERL's TR N-92, *Guidelines for Review of EA/EIS Documents* (Fittipaldi 1980), establishes an efficient, systematic procedure for comprehensive, uniform evaluation of EAs and EISs. It addresses evaluation of administrative compliance, general document compliance, and technical review, and outlines a procedure for preparing review summaries in tabular form, leading to an ultimate recommendation on the technical adequacy and completeness of the document.

More specific guidance on assessment techniques for particular areas of environmental concern is also available. For example: land use concerns are addressed in *Land Use Planning* (TM 5-803-8); transportation issues are addressed in *Transportation Planning* (ETL 1110-3-390) and in *General Provisions and Geometric Designs for Roads, Streets, Walks and Open Storage Areas* (TM 5-822-2); natural resources issues are addressed in *Natural Resources—Land, Forest, and Wildlife Management* (AR 420-74), and in *Natural Resources Land Management* (TM 5-630); assessment of noise issues is addressed in *Environmental Protection Planning in the Noise Environment* (TM 5-803-2); and historic resources are addressed in *Historic Preservation* (AR 420-40), *Historic Preservation, Administrative Procedures* (TM 5-801-1) and *Historic Preservation, Maintenance Procedures* (TM 5-801-2). Citations for these and other relevant regulations and technical reports are listed in the References section of this report (p 61).

#### **Environmental Compliance**

The risks and costs associated with noncompliance with the various environmental regulations referenced above can be very high, ranging from criminal charges, steep fines, clean-up costs, need for restoration, payment for damages, and lost time and effort in implementation of the affected project, to the intangible costs of negative publicity. Such costs are associated more with the regulations specifically

addressing environmental quality, such as the Clean Air Act, the Federal Water Pollution Control Act, and the Resource Conservation and Recovery Act (RCRA), than those addressing environmental planning, such as NEPA. Nonetheless, the costs of noncompliance or poor compliance with NEPA can also be high, particularly through neglect of a potential problem or a lack of mitigation monitoring.

AR 200-1 emphasizes the need for environmental compliance, stating that "all personnel will ensure that all instances of noncompliance with environmental laws and permits are identified and corrected immediately" (AR 200-1, p 62). It outlines a process for noncompliance reporting to MACOM and to the U.S. Army Toxic and Hazardous Materials (USATHAMA), with USATHAMA acting as a technical support to the Army Environmental Office (AEO) in collecting, analyzing, and reviewing Army data on Notices of Violation (NOVs) and spills. This process applies to oil and hazardous substances spills; environmental crises; illegal dumping; and unexplained human illness, injury, or death. AR 200-1 outlines steps to take for immediate notification, funding procurement, and implementation of solutions. It clearly notes that Federal employees are not immune from prosecution for violations of Federal law and it lists the relevant regulations of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), RCRA, and the Clean Water Act (AR 200-1, pp 61-63).

Environmental auditing is used as a means to achieve, maintain, and monitor compliance with applicable environmental regulations. According to AR 200-1, auditing may be used as a vehicle for attaining Army environmental program goals and for improving program visibility. External environmental audits for Army installations are required at least once every 4 years; an internal self-audit is to be conducted at the midpoint of each external audit cycle (i.e., at least every 2 years). The external audits may be conducted under contract or by enlisting the assistance of U.S. Army Environmental Hygiene Agency (USAEHA), USATHAMA, and MACOM personnel, or personnel from another installation. Audits are to be conducted according to the protocol developed by USACERL. Following external audits, each installation is to develop a management plan to correct any identified deficiencies. These management plans are to be updated annually and are to address the construction projects, funding, training, monitoring, permits, surveys, and other activities that are necessary to achieve compliance (AR 200-1, p 63).

An additional requirement of AR 200-1 is the establishment of an Environmental Quality Control Committee (EQCC) for each installation. The EQCC is to be comprised of representatives of the command, operational, engineering, planning, resource management, legal, safety, and medical interests of the installation, including all tenant activities. Required members include the installation or community commander (or designated representative), other affected commanders, the Directorate of Engineering and Housing (DEH), the environmental officer, the director of each major staff section, and representatives from various offices and functions. The EQCC meets monthly and acts on a broad range of environmental issues. It advises the Installation Commander on environmental priorities, policies, strategies, and programs (AR 200-1, p 64).

The emphasis on environmental compliance evident in AR 200-1 needs to be carried over (through cross-reference and summary discussion) to other Army regulations touching on environmental issues, including AR 200-2, *The Environmental Effects of Army Actions*, and AR 210-20, *Master Planning for Army Installations*. Through this repetition of the importance of environmental compliance, the message can be driven home to all affected and responsible personnel.

Improved environmental compliance within the context of increased integration of master and environmental planning can be achieved through improved coordination of an installation's EQCC (described above) and Installation Planning Board (IPB, described in Chapter 2). The installation planner should be a required member of the EQCC and the environmental officer should be a required member



of the IPB. Joint meetings of the two bodies should be held where planning issues touch on environmental quality issues and *vice versa*.

Environmental compliance could also be enhanced through the establishment of an Army-wide "bank" of environmental specialists who may be called on to troubleshoot difficult environmental protection problems or to assist in compliance efforts. This could be developed as an extension of the current role of USATHAMA and/or USAEHA personnel in conducting audits and responding to compliance emergencies. The Discuss with Experts Environmental Problems (DEEP) computer bulletin board program (described in more detail in Chapter 5) could also be used as a forum for troubleshooting.

### **Mitigation Monitoring**

Closely linked to the issue of environmental compliance is the need to follow through on the implementation of mitigation measures identified by environmental analysis. The most recent version of AR 200-2, *Environmental Effects of Army Actions* includes an Appendix that presents methodologies for implementing a monitoring and mitigation program (AR 200-2, App F). Mitigation measures identified in an FEA or EIS must also become a line item in the proposed budget for a project (AR 200-2, p 7).

Appendix F of AR 200-2 provides guidance for preparing two types of monitoring systems: enforcement, and effectiveness monitoring. Enforcement monitoring ensures that mitigation is being performed as described in the environmental document and that mitigation requirements and penalty clauses are written into any project contracts and are subsequently enforced. Effectiveness monitoring measures the success of the mitigation effort and/or the environmental effect of that mitigation effort. This normally requires a scientifically based quantitative investigation (AR 200-2, App. F).

Appendix F points out that the key to mitigation implementation is the provision of adequate manpower and funding. Unless money is actually budgeted and manpower assigned, the mitigation cannot be implemented. In addition, if the mitigation is not funded on schedule with the action, the action can be judicially stopped. Therefore, the project proponent office must coordinate the action early in the process to allow time to get the mitigation activities into the budget cycle (AR 200-2, Sect. F-2d[3]).

It can be helpful to integrate environmental assessment into the master planning process to ensure that mitigations are actually implemented and properly monitored. If environmental factors are fully integrated into the master planning process (as described throughout this report), mitigating approaches can be built directly into the installation master plans. This heightened environmental sensitivity of the master plan, sometimes referred to as a "pre-mitigated" plan, can help to reduce the number of specific mitigation measures identified by the environmental document, and to reduce the number requiring implementation and monitoring.

In addition, just as the environmental assessment of actions implemented subsequent to a master plan may be "tiered" off of a comprehensive program-wide EIS prepared for the master plan itself (see discussion below), a program-wide mitigation monitoring plan may also be prepared for the master plan. This program-wide mitigation monitoring plan can serve as a basis for subsequent, more specific mitigation monitoring plans prepared for these actions. In general, improved interface between the master planning and environmental assessment processes can help ensure that mitigation monitoring occurs as an integral part of master plan implementation (Figure 5 illustrates this concept).

### **Integration With the Planning Process**

Although not well reflected in the Army's regulations governing installation master planning (as discussed in Chapter 2), the Army regulations governing environmental assessment place great emphasis on the need and desire to integrate environmental assessment into the planning process. This mandate is

carried through with increasing emphasis and guidance from the relatively brief text of NEPA itself to the CEQ Regulations to AR 200-2.

The first of a nine-point directive from Congress contained in NEPA states that all agencies of the Federal Government shall "utilize a systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking that may have an impact on man's environment" (emphasis added) (NEPA, Sec. 102[A]).

The CEQ Regulations take the integration concept further by clearly stating that it is not better environmental documents but better decisions that make a difference in protecting the environment. According to the Regulations, NEPA's purpose is not to generate (even excellent) paperwork, but to foster excellent action. To foster such action, the Regulations specifically direct Federal Agencies to: "integrate the requirements of NEPA with other planning and environmental review procedures required by law or by agency practice so that all such procedures run concurrently rather than consecutively" (title 42 CFR, Part 1500.2[c]) (emphasis added).

The Regulations place a further emphasis on the integration of the NEPA process early in the planning process to ensure appropriate environmental consideration and to reduce delay: "Agencies shall integrate the NEPA process with other planning at the earliest possible time to ensure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts . . . . Environmental documents and appropriate analyses shall be circulated and reviewed at the same time as other planning documents" (title 40 CFR, Part 1501.2) (emphasis added). CEQ Regulations stress applicability and importance of early environmental review even at the broadest policy level, such as in the preparation of installation master plans: "Agencies shall prepare statements on broad actions so that they are relevant to policy and are timed to coincide with meaningful points in agency planning and decisionmaking" (title 40 CFR, Part 1508.18).

This emphasis is echoed in the Army's own environmental assessment regulations (AR 200-2), which include additional language on integrating NEPA requirements with other planning procedures, early consideration of environmental concerns, concurrent rather than consecutive review, and use of an interdisciplinary approach to planning. The importance of environmental values in the planning process is specifically stated:

To be effective, integration of the NEPA process with other Army project planning will occur at the earliest possible time to ensure [that] planning and decisionmaking reflect environmental values . . . [A]II Army decisionmaking that may have an impact on the human environment will use a systematic, interdisciplinary approach that ensures the integrated use of the natural and social sciences, planning, and the environmental design arts . . . This approach allows for timely identification of environmental effects and values in sufficient detail for evaluation concurrently with economic, technical, and mission-related analyses at the earliest possible step in the decision process. (AR 200-2, Sect. 2-1[b,c])

Section 2-6 of AR 200-2 deals specifically with the integration of environmental assessment requirements with Army master planning. It states that:

The Army goal to integrate environmental reviews concurrently with other Army planning and decisionmaking actions avoids delays in mission accomplishments. To achieve this goal, proponents should provide complete environmental documents for early inclusion with any recommendation or report to decisionmakers ([e.g.,] Master Plan . . . ). Environmental analyses and documentation . . . will be integrated as much as practicable with . . . Installation and Army master planning functions and plans. (AR 200-2, Sect. 2-6[a],[e])

To meet these goals, AR 200-2 identifies a number of tools that can aid in the integration process. Among these are programmatic environmental review, whereby "program" level environmental analyses are conducted for general application, to eliminate repetitive discussions of the same issues and to focus

on the key issues at each level of project review (see further discussion below) (AR 200-2, Sect. 2-6 [c]); preparation of an Environmental Planning Guide; and preparation of an Environmental Planning Record. The Environmental Planning Guide is an optional document prepared at the outset of a major program/concept-level project. It provides guidelines and supporting rationale to help planners and designers prevent, avoid, or minimize adverse environmental effects through environmentally sensitive design and planning (AR 200-2, Sect. 3-2[a]). An Environmental Planning Record (also an optional document) records the progress and process of environmental considerations throughout a given program's development. It provides a visible track record of how environmental factors have actually been considered and incorporated throughout the planning process (AR 200-2, Sect. 3-2).

Given all of the detailed, specific guidance on the integration of environmental assessment and the master planning process contained in the relevant environmental regulations, it is surprising that virtually none of this attention is carried through to the master planning regulations. The primary regulation guiding master planning, AR 210-20, addresses NEPA documentation only as one of 14 sections to be included in the Master Plan Narrative. It states simply that an EA should be included "providing an analysis of the environmental impact of planning proposals" (AR 210-20, Sect. 4-7 [b,1]). It then goes on to refer to TM 5-803-1, *Installation Master Planning* (TM 5-803-1) for guidance. (As discussed in Chapter 2, the master planning process and contents described in TM 5-803-1 are inconsistent in several instances with AR 210-20.) The master planning flow chart in TM 5-803-1 (reproduced here as Figure 3) shows environmental assessment as a component of both the concept development and master plan development process, but its role in the concept stage is not fully described in TM 5-803-1. (In fact, AR 210-20 does not even recognize a "concept plan" stage.) Chapter 2 of this report contains additional discussion on the current master planning regulations and sets forth recommendations to enhance their usefulness and environmental sensitivity.

While TM 5-803-1 does contain a brief discussion on environmental assessment (TM 5-803-1, pp 5-1 to 5-3), nowhere are the notions of integration, early consideration, concurrent preparation, use of environmental values in decisionmaking, or interdisciplinary evaluation, identified or discussed. In apparent contradiction to the Army's environmental regulation (AR 200-2), TM 5-803-1 states that, if an EIS is found to be necessary, it "will be [a] separate document and separate work effort from the Master Plan." Reconfiguration, reorientation, or relocation of incompatible land uses or facilities are listed as possible mitigation measures that "most likely would have been accomplished during the planning process" (TM 5-803-1, p 5-1).

It must be concluded that the Army's master planning regulations are consistent with its environmental assessment regulations only insofar that an environmental assessment is prepared to accompany an installation master plan, but that the often-repeated policies and direction to integrate the two processes and allow for the incorporation of environmental values into the decisionmaking process are not reflected in the master planning regulations. With this lack of consistent direction, it is not surprising that the Army's installation master plans are not as environmentally sensitive as they could be and that poor compliance with environmental regulations and the costs of environmental remediation are becoming of increasing concern.

The current updating of the Army's master planning regulation, AR 210-20 (discussed in Chapter 2), is an excellent opportunity to carry over the environmental regulations' emphasis on integration into the master planning regulation. Improved direction on integration, early assessment, and interdisciplinary review can help to improve the environmental sensitivity of the Army's master plans and to incorporate environmental values into the decisionmaking process. Improved integration will also place more emphasis on the environmental documentation process, so that it is seen as an important and integral part of the master planning process and not simply as a regulatory hurdle that must be cleared prior to master plan approval. This, in turn, should improve the overall level of compliance with NEPA regulations and the quality of the environmental documents that are produced.

## Programmatic Review and Tiering

As noted above, one of the tools identified by AR 200-2 to achieve integration of environmental assessment with planning and other processes is the review of broad, "program-wide" actions, followed by a "tiered" assessment of more specific actions within the program. AR 200-2 encourages Army agencies to write programmatic environmental analyses when such programs are being considered for general application. The subsequent "tiered" document need only summarize issues discussed in the broader statement and concentrate on the issues specific to the subsequent action. This serves to eliminate repetitive discussions of the same issues and to focus on the key issues at each appropriate level of project review (AR 200-2, Sect. 2-6(c)). The CEQ Regulations specifically identify tiering from a program-level review of an EIS on a plan to an analysis of lesser scope or to a site-specific assessment as an appropriate use of this approach (Council on Environmental Quality, Sect. 1508.28).

The programmatic review/tiering process can be particularly valuable in application to the installation master planning process. The proposed master planning process presented in Chapter 2 (Figure 5) shows that a Master Environmental Impact Assessment (i.e., a program-level EIS) would be prepared concurrently with master plan preparation, and subsequent tiered environmental documentation (based upon and using the Master Environmental Impact Assessment) would be prepared as specific projects or plan components are implemented. The short-term and mobilization elements of the master planning process may be analyzed as part of the Master Environmental Impact Assessment or may themselves be analyzed as part of subsequent tiered documents.

This approach would require the preparation of an EIS rather than an EA on the installation master plan, despite the indication in AR 200-2 that an EA may be the appropriate level of environmental review for installation master plans (except where significant environmental impacts are expected to result). Note that effective use of the tiering process as proposed here requires that the Master Environmental Impact Assessment be truly comprehensive in scope and analysis, as opposed to a generalized assessment. In other words, the Environmental Assessment should attempt to be as all-inclusive and detailed as possible at the program level, and should go beyond simply addressing concerns at an overall, generalized level, as "program-level" analysis is sometimes interpreted to mean. Only with a truly comprehensive, complete master assessment, can the subsequent tiered environmental documents be effectively streamlined and focused.

There are many advantages to this integrated approach. First, the consideration of environmental concerns can be comprehensively integrated early in the master planning process. In this way, potential environmental problems can be identified and the master plan adjusted before any great expenditure of effort occurs. The comprehensiveness of the evaluation will help reduce the risk of environmental "show-stoppers" occurring at later stages of the process. The master plan will not only avoid obvious environmental concerns, but will tend to be more environmentally sensitive in nature, since environmental information will be developed continuously during the planning process and will tend to be incorporated into the plan.

In addition, by doing more environmental assessment work up-front, during the planning stage, considerable savings and time can be realized as projects and programs are implemented. These savings will be critical for important projects that must be expedited quickly, as often happens during mobilization. These savings will also be cumulative throughout the implementation life of the master plan and will ultimately result in a much reduced total expenditure than would the standard approach of preparing independent EAs or EISs on each implementation action. Finally, full compliance with NEPA and related environmental laws will be better assured by having a comprehensive, environmental review basis for all master plan activities. If employed diligently, such an approach should result in a "paper trail" for environmental review that can better withstand adequacy challenges than could independent environmental assessments or those based on a generalized master plan assessment.

## Environmental Goals and Objectives

Army regulations and guidelines outline many goals and objectives dealing with environmental quality and protection issues. However, there is no one definitive policy statement to govern the Army's approach to these important issues. This may be an appropriate time for the declaration of such an overriding policy statement given the clear direction from the present political administration and Defense Department that the United States should be a world leader in addressing environmental problems, and that the Department of Defense (DOD) should be the Federal leader in agency environmental compliance and protection (DOD 1990).

AR 200-1 identifies a number of specific environmental quality goals and policies with the overall purpose of protecting the environment and conserving our natural resource heritage, both for ourselves and for future generations (AR 200-1, p 21). These overall goals include:

- demonstrating leadership in environmental protection and improvement
- minimizing adverse environmental and health impacts while maximizing readiness and strategic preparedness
- assuring that consideration of the environment is an integral part of Army decisionmaking
- initiating aggressive action to comply with all applicable federal, state, regional, and local environmental quality laws
- restoring lands and waters damaged through our past waste disposal activities
- supporting Army programs for recycling and reuse of materials to conserve natural resources, prevent pollution, and minimize the generation of wastes
- pursuing an active role in addressing environmental quality issues in our relations with neighboring communities (AR 200-1, p 21).

Among the policies identified to achieve these goals are:

- the environmental effects of any proposed action will be considered during the earliest stages and throughout the planning process . . . Such effects will be evaluated in the decisionmaking process along with technical, operational, mission-related, regulatory, and economic factors.
- programs and actions will be considered, planned, initiated, and carried out in such a way as to prevent, minimize, or mitigate degradation of the environment or endangerment of human health (AR 200-1, p 21).

Table 2 lists a number of proposed policy statements for the installation master planning process, some of which touch on environmental issues, including:

- guidance for functionally efficient, economical, environmentally sensitive, and aesthetically pleasing placement of uses and activities meeting the military requirements of the installation [emphasis added]
- full integration of environmental concerns and environmental impact assessment of uses and activities as part of the master planning process
- minimization of the impact of installation uses and activities on the natural, social, and cultural environment

- encouragement of conservation and wise stewardship of natural resources
- providing for the implementation of environmental restoration needs, where needed
- developing an accurate audit trail for all planning and construction decisions.

In addition, ETL 1110-3-407 identifies a number of sample goals and objectives that may be included in the Environmental Quality Protection Plan component of an installation master plan. The sample goals are to:

- minimize unavoidable generation of air pollutants through comprehensive planning, design, and operational decisions
- for unavoidable emissions sources, use cost-effective air pollution control technology
- avoid degradation of receiving water as a result of discharge of treated effluent from wastewater treatment facilities
- prevent degradation of water quality from toxic or hazardous substances.
- minimize the potential for adverse water quality effects from urban runoff
- minimize the volume of solid and hazardous wastes requiring disposal
- develop management plans that will provide for safe storage, transport, and disposal of waste that cannot be feasibly recycled or reused
- minimize exposure of community and working environments to adverse noise levels (ETL 1110-3-407, pp 2-3 to 2-4).

These suggested environmentally-related goals could be combined with those already identified in the Army's regulations into an official Army environmental policy statement. Such a statement would help to clarify and emphasize the DOD's stance on environmental concerns, resolving any apparent inconsistencies or lack of clarity in current regulations, and giving a boost to environmental compliance efforts through improved education.

### Summary of Concerns

Several Army regulations and guidelines address environmental concerns, including those associated with environmental quality and protection and those associated with the assessment of environmental impacts. For the most part, these regulations and guidelines are consistent and complementary in covering the full range of environmental concerns. However, there is room for improvement in the important area of environmental compliance. Despite the clarity and strength of the Army's environmental regulations, problems with compliance continue. Solutions lie in administrative procedures, education, training, coordination, and in increased emphasis on the relevant regulations and guidelines.

There is also a potential for a voluminous, redundant array of environmental documentation to be prepared in response to the various environmental regulations for any given Army installation. Such documents include EAs, EISs, and mitigation monitoring plans prepared pursuant to NEPA, the Environmental Quality Protection Plan component of the master plan, the Installation Restoration Program (IRP), the Environmental Baseline Study (EBS), the Natural Resource Management Plan, environmental audit reports, and the optional Environmental Planning Guide and Environmental Planning Record. These documents can and should serve distinct purposes and need not repeat basic environmental data. Under

the restructured master planning/environmental assessment approach set forth here, a Master Environmental Impact Assessment would be prepared for an installation master plan. This document would take the place of the Environmental Quality Protection Plan component and in most cases would eliminate the optional planning guides and records. The remaining documents would serve more specific purposes (largely related to site contamination cleanup and prevention) and can refer to the Master Environmental Impact Assessment for basic environmental background information.

Review of the relevant environmental assessment regulations reveals a strong potential to integrate such assessment into planning processes through early and continuous consideration of environmental concerns, concurrent preparation of documents, and allowance for revision and mitigation. However, the current structure of the installation master planning process does not allow for integration of environmental concerns and assessment findings. The current update of the Army's master planning regulations presents a good opportunity to introduce a fully integrated approach that would help enhance environmental compliance and mitigation monitoring. A tiered environmental review process based upon a comprehensive Master Environmental Impact Assessment of an installation master plan is proposed here as a way to improve the environmental responsiveness of the master planning process and the level of compliance with NEPA, while reducing the overall costs associated with environmental review.

Finally, development of a more complete and consistent environmental policy statement than presently exists would help to underscore the Army's environmental commitment and give a supportive boost to continuing compliance efforts.

## **Recommendations**

To enhance compliance with the Army's environmental regulations and improve integration of environmental concerns with the master planning process, it is recommended that:

### **1. Environmental Assessment Should Be Considered Early in the Planning Process; Be Prepared Concurrently With the Master Plan; and Foster Environmentally Sensitive Decisionmaking**

As clearly set forth in NEPA, the CEQ Regulations, and the Army's own environmental assessment regulations (AR 200-2), environmental assessment shall occur early in the [master] planning process, be integrated into the master planning process with concurrent preparation, and help to foster decisions reflecting environmental values. Several of the recommendations contained in this report and the restructured planning process presented herein are directed at improving Army responsiveness to this important legislation.

### **2. Revise the Army's Master Planning Regulations to Reflect the Mandate To Integrate the Environmental Assessment and Planning Processes**

The emphasis on integration of the planning and environmental assessment processes that is mandated in the Federal environmental legislation and reflected in the Army's corresponding regulation should be carried over to the Army's master plan regulation (AR 210-20). The current updating of this regulation provides a good opportunity to achieve this cross-regulatory consistency. Information contained in ETL-110-3-407 should be incorporated into the update or cross-referenced as a Technical Manual.

### **3. To Achieve Integration, Prepare a Master Environmental Impact Assessment Concurrently With Master Plan Preparation, With Subsequent "Tiering" of More Specific Environmental Review for Implementing Actions**

A basic, concluding recommendation of this report is the application of a programmatic review/tiering process to installation Master Plans. Under this proposal, a Master Environmental Impact Assessment (i.e., Program-level EIS) would be prepared concurrently with master plan preparation, and

subsequent tiered environmental documentation (using the Master Environmental Impact Assessment as a basis) would be prepared on specific projects or master plan components as they are implemented. This process is illustrated in Figure 5 and discussed further in Chapter 4.

#### **4. Reduce Redundancy in Installation Environmental Documents**

The length and number of environmentally-related documents for any given Army installation can be reduced by preparing a Master Environmental Impact Assessment on the installation master plan. The need for the Environmental Quality Protection Plan component of the master plan and (in most cases) the optional Environmental Planning Guide and Environmental Planning Record would be eliminated through preparation of the Master Environmental Impact Assessment. The Master Environmental Impact Assessment can also be used as a source of reference for other documents with more specific purposes. These other documents can be closely limited to their purpose at hand (e.g., restoration of contaminated areas) and simply refer to the Master Environmental Impact Assessment for background information.

#### **5. Achieve "Pre-mitigation" of Installation Master Plans Through Integration**

By integrating environmental assessment with the installation master planning process, as described in this report, mitigation measures can be incorporated directly into the master plan, thus "pre-mitigating" the action and reducing the extent of subsequent mitigation needed. This potential should be used effectively during the master plan preparation process.

#### **6. Consider Preparation of a Manual To Guide Preparation of Master Environmental Assessments on Master Plans**

To assist in preparing Master Environmental Assessments on installation master plans, consider preparing a technical manual to be used in conjunction with the updated AR 200-2 and USACERL TR N-130, and to provide more specific guidance on procedures and methods for master assessment and subsequent tiering.

#### **7. Increase Emphasis on Environmental Compliance in Regulations**

The emphasis on environmental compliance evident in AR 200-1 should be carried over to AR 200-2 and AR 210-20 through cross-reference and summary discussion to focus attention on this important area.

#### **8. Develop an Official Army Environmental Policy Statement**

A number of suggested environmentally-related goals could be combined with those already expressed in the Army's regulations to create an official, comprehensive Army environmental policy statement. Such a statement would help underscore the Army's commitment to environmental protection, resolve any apparent inconsistencies or lack of clarity in current regulations, and give a boost to education and compliance efforts.

#### **9. Improve Coordination Between Environmental Quality Control Committees and Installation Planning Boards**

Improved environmental compliance and integration of the master planning and environmental assessment processes can be achieved through increased coordination of an installation's Environmental Quality Control Committee (EQCC) and Installation Planning Board (IPB). To improve coordination, the installation planner should be a required member of the EQCC and the environmental officer should be a member of the IPB. Joint meetings of the two bodies should be held where planning and environmental quality issues arise.



#### **10. Establish an Army-wide "Bank" of Environmental Specialists**

Environmental compliance could also be enhanced by establishing an Army-wide "bank" of environmental specialists to troubleshoot difficult environmental protection problems or to assist in compliance efforts. This could be developed as an extension of the current role of USATHAMA and/or USAEHA personnel in conducting audits and responding to compliance emergencies, or as an expanded use of the DEEP computer bulletin board program.

#### **11. Continue Emphasis on Mitigation Funding and Scheduling**

As noted in AR 200-2, a mitigation cannot exist if it is not funded on schedule with the action requiring the mitigation (AR 200-2, p 80). The requirement to establish funding for mitigation in a timely manner should continue to be emphasized at all levels.

#### **12. Prepare a Program-Level Mitigation Monitoring Plan for the Installation Master Plan**

Preparation of a program-wide mitigation monitoring plan on an Installation master plan can serve as a basis for subsequent, more specific mitigation monitoring plans for actions and projects implementing the master plan. This can ultimately result in cost savings and improved follow-through of planning objectives at the project level.

#### 4 INTEGRATION OF ENVIRONMENTAL AND MASTER PLANNING

As a Federal agency, the Army is required to identify environmental effects of proposed programs and projects in sufficient detail and to compare them with economic, technical, and other considerations concurrently in planning and decisionmaking. The requirement to prepare environmental documents (EAs, EISs, et cetera) on proposed programs and projects is the established and accepted means of accomplishing this statutory requirement (DA PAM 420-9, Sect. 12-7[b], emphasis added).

##### Which Should Come First?

Chapters 2 and 3 explored the potential for greater integration of the environmental and master planning processes. Chapter 2 addressed the shortfalls of the current master planning process and suggested improvements to better address environmental concerns. Chapter 3 suggested preparing a programmatic Master Environmental Impact Assessment with subsequent tiering. This chapter extends these two concepts by outlining an integrated approach as it may best be adopted by the Army. A useful first step is to review the basic question of sequencing that has plagued Army planners since environmental concerns first grew in importance.

Assessment of environmental concerns early in master plan preparation offers the advantage of providing information that can be used as a basis for preparing the master plan, making it more environmentally sensitive and responsive to important constraints and opportunities. However, at this stage, environmental analysis can occur only at the broadest level, since the extent of the master plan actions is not yet known. Such an assessment quickly loses its value as conditions change and as the master plan evolves in the planning process. On the other hand, taking master plan goals and objectives as the sole starting point and deferring environmental analysis until after concepts and alternatives are defined can allow a more substantive assessment, but at a substantial risk. Results of the environmental analysis can reveal basic environmental conflicts requiring extensive mitigation, and in some cases, redefinition of the master plan. Such a conclusion can be disastrous in terms of loss of time and expenditure and pressure to leave the environmentally flawed plan as is.

By reviewing these two, very real scenarios, it becomes clear that the answer to the sequencing question is neither simple nor easy to implement: environmental assessment must occur simultaneously with the master planning process. Identification of environmental constraints and opportunities and a description of the baseline environmental conditions should occur early and should become an input to the planning process, helping to inform the development of concept plans and alternatives. Then, once concept plans and alternatives are developed, the assessment of the probable impacts of these concepts and alternatives should occur to help in the selection of a preferred plan. Finally, complete assessment of the master plan is necessary to identify mitigation measures and to fulfill the requirements of NEPA. Thus, it can be seen that this simultaneous process actually occurs in several discrete steps with constant iterative revision from feedback loops between the plan and its environmental evaluation.

It is easy to see that such an iterative integrated process could become cumbersome and intimidating unless carefully controlled and defined. Consequently, while Army planners may recognize the dangers inherent in foregoing simultaneous preparation, this may often prove the path of least resistance.

One purpose of this report is to clarify the issues of concurrent preparation and to present a system that is efficient and easy to follow. A fully integrated environmental and master planning process will enhance implementation of actions and projects under the master plan and will improve overall environmental sensitivity and compliance.

## History of the Integrated Approach

The U.S. Army is not the first entity to grapple with the issue of how best to integrate environmental assessment and the planning process. During the past 20 years, there has emerged a modest body of literature by specialists in comprehensive planning and environmental assessment that has addressed this issue from theoretical, policy, and practical standpoints.

Ian McHarg's landmark book, *Design With Nature* (1969) did not specifically address the question of integration, but did present a series of composite environmental constraints maps used in rankings of various natural and social values and the consequent identification of "developable" areas and optimum land uses. Although what came to be known as the "overlay method" of environmental planning was tremendously simple and not necessarily new, it was McHarg's eloquent presentation of this approach that resulted in something of a revolution in land use planning and a redirection in how planners and others viewed the environment. In fact, the Army had already been employing its own overlay method for installation planning since at least 1966 when an early version of TB ENG 353 was published, entitled *The Overlay-Composite Method of Master-Plan Preparation*. However, the Army used the overlay approach solely as a cartographic technique for the presentation of information, and not as a planning/decisionmaking tool.

McHarg and others during the late 1960s helped to create the environmental awareness that led to the adoption of NEPA in 1969. It was this Act, the subsequent Council on Environmental Quality Regulations, and several "mini-NEPAs" adopted by individual states that has led to the practice of environmental impact assessment as it is known today.

Practitioners in the environmental assessment field and academics researching and teaching in this area have, on occasion, explored the issue of integration. Overall, existing research advocates the integration of environmental assessment into the comprehensive planning process with the expected benefits of greater environmental sensitivity, reduced risks of preparing flawed plans, and reduced costs in later environmental assessment as plans are implemented (Armour 1989, pp 3-7; Wood 1988; Rogers 1976; Willson, Tabas, and Henneman 1979, pp 139-149). Many researchers have pointed out that the suitability of the integration of the two processes is manifested by the similarity of the comprehensive-rational planning process and the environmental impact assessment process (Wood 1988, pp 98-114; Armour 1989, pp 4-11). Theoretically, it is compelling to attempt to combine the two processes. In practice, however, true integration has been slow to occur. Reasons given include the lack of an integrated framework for linking disparate sciences and fields together; the need to bring together competing interests and perspectives; and the need for organizational integration or the bringing together of private and public implementing agencies in a unified management approach (Armour 1989, pp 4-11).

Serge Taylor's book, *Making Bureaucracies Think*, explores institutional and bureaucratic barriers to integrated planning and environmental compliance. Taylor uses the U.S. Army Corps of Engineers as case study, exploring the gradual introduction of nonengineering concerns into the Corp's civil projects (Taylor 1984, pp 95-103). Despite these barriers, the literature cites impressive success stories of the integrated approach (Rodgers 1976, pp 132-135; Twiss 1974) and holds out the expectation for further integration to occur, as an environmentally-driven mandate of the 1990s (Armour 1989, p 10; Rickson, Burdge, and Armour 1989, pp 347-357). In revamping its master planning regulations to more fully integrate environmental assessment, it appears that the Army may be at the forefront in taking up this renewed challenge.

## A Proposed Iterative Process

Chapter 2 introduced the concept of revising the Army's master planning process to allow fuller integration of environmental concerns, and Chapter 3 discussed the concept of preparing program-level environmental documentation (termed a "Master Environmental Impact Assessment") on master plans with

tiered assessment of specific actions to follow. These concepts are shown in Figure 5. Combining these concepts by restructuring both the installation master planning process and the environmental assessment process (as it pertains to master plans) yields true integration.

Under the restructured/integrated approach, the keystone planning document for an installation would be the Long-Range Installation master plan, which would cover an optimum planning horizon of up to 25 years. This comprehensive document would serve as an enduring basis for more focused planning efforts, including the Short-Range Construction Programming/Plans and Mobilization/Mission Plans. The Long-Range Installation Master Plan would replace the current comprehensive planning process for installation master planning, including its 14 component plans, existing conditions maps, land use plan, transportation plan, utilities plan, future development plan, and master plan narrative.

Analogous to the Long-Range Installation Master Plan on the environmental assessment side of the process would be the preparation of the Master Environmental Impact Assessment, a program-wide EIS that would be prepared simultaneously with the Long-Range Master Plan and would serve as a comprehensive basis for subsequent environmental review of all actions occurring under the master plan. The Master Environmental Impact Assessment would replace the Environmental Quality Protection Plan component plan of the master plan and the environmental assessments of the concept plan and the final master plan. (Figures 1 and 3 illustrate the current master planning process.)

Figure 5 shows how the master planning process would be modified to more closely resemble the rational planning approach. The first step in the process would be to identify specific goals and objectives for the installation. Table 2 and the Environmental Goals and Objectives section of Chapter 3 (p 41) present a series of general goals addressing master planning and environmental planning issues, respectively. These suggested policies would serve as a good starting point for a master planning effort. Of course, specific goals and objectives would vary for each installation.

The next step would involve data collection and description of existing conditions. Many installations may already have this information available as part of previous master plan components or environmental assessments. However, the currency and quality of the information would be highly important since it would affect essentially all subsequent land use decisions. Note that only a limited portion of environmental information would be directly useful to the master planning effort. It is important not to carry over the voluminous burden of previous master planning efforts into the new Long-Range Master Plan.

General areas of concern for which information may be gathered at this stage include:

- area-wide land use planning documents
- land uses and zoning, both on- and off-site
- topographic information
- geologic information, including bedrock types, interpretive geology (where available), unique landforms, geologic hazards, and mining resources
- soil types and capabilities
- natural hydrology, flood hazard, and storm drainage characteristics
- water quality
- biological information, including vegetation cover, wildlife habitat, presence or potential for any rare or endangered species, agricultural value, forestry resources

- visual quality, including visual characteristics, prominent features, views from the site, views to the site, sources of light and glare
- historic, archaeologic, and cultural resources
- transportation issues, including the circulation network, traffic volumes, and pedestrian, bicycle, and public transit conditions
- air quality
- noise levels and sources
- presence and potential for hazardous materials contamination
- other public health concerns
- population and housing information
- public services in the area, including police and fire protection, schools, hospitals, emergency response, parks and recreational opportunities
- utilities, including sewer, water, solid waste, communications, gas, and electricity.

The data collection/description of existing conditions step would result in two products. The first product would be an opportunities/constraints map or series of maps that would be valuable in subsequent determination of master plan alternatives. (Tools and techniques that can be used to prepare this kind of geographic information are addressed in Chapter 5 of this report.) The second product would be a comprehensive description of the environmental setting for the installation that may be used as the NEPA-required "setting" section of the Master Environmental Impact Assessment. Use of this information in both the master planning process and in the NEPA document would have the benefits of efficiency and cost-effectiveness, although it would require additional work early in the process.

It should be noted that much of the information developed above may be collected into optional technical background reports, which are simply summarized in the master plan or Master Environmental Impact Assessment. Use of technical background reports can help make the master plan and/or Master Environmental Impact Assessment understandable and accessible and can provide an opportunity for in-depth examination of important technical areas, such as transportation and circulation. These technical background reports would differ from the currently-required component plans in that they would be optional and would act only as support to the master plan, not as actual planning documents.

Next, and possibly simultaneous with the gathering of the environmental information, would be the definition of the program requirements for the master plan and the development of a concept-level plan. This would be perhaps the most challenging step for the installation planner, who must elicit, translate, and synthesize the master plan objectives of a number of disparate sources, including Major Commands, other affected commands, staff functions, tenants, and surrounding community/other agency representatives. Techniques such as "town meetings," open houses, workshops, surveys, and newsletters should be used to outreach to the affected community. The effectiveness and usefulness of the installation master plan will only be as good as its ability to respond to the needs of the affected community.

Once a concept plan and program description of land uses and activities have been developed, a definition and evaluation of a range of alternatives for the master plan can be prepared, using technical background data and cost estimates. At this stage the planner must work closely with an interdisciplinary team, including utility and transportation engineers, architects, landscape architects, budget analysts, environmental scientists, and community representatives. The greater the range of likely alternatives

developed, the better the chances are that the ultimate future disposition of the installation will have been covered by the master planning document and associated environmental assessment.

At this point, a brief, comparative impact assessment of the various alternatives should be conducted to help select a preferred alternative and to form the basis for the NEPA-required alternatives assessment. Again, the broader the range of alternatives (as long as they are reasonable alternatives), the stronger the environmental assessment will be in addressing a full spectrum of potential implementation scenarios. The breadth and quality of the alternatives assessment will add to the useful life of the master plan document and its associated environmental documentation.

Based upon the assessment of the various alternatives and other decisionmaking factors, the next step in the process would be to select and refine a preferred (or revised) alternative to serve as the model for the proposed master plan. This Preferred Development Plan would consist of a series of illustrative maps showing future land uses, circulation, utilities, etc., together with a narrative description and implementation program. The Preferred Development Plan should be developed to a much greater detail than were the alternatives, again using the talents of a multidisciplinary team of design professionals.

Preparing a Master Environmental Impact Assessment (i.e., EIS) would occur simultaneous to preparation of the Preferred Development Plan and Program. This Master Environmental Impact Assessment would assess the potential impacts of the master plan at a "program" level. It could directly incorporate the environmental setting prepared early in the process and the alternatives analysis prepared in the previous step. At this step, what remains to be prepared for the Master Environmental Impact Assessment is a detailed evaluation of the potential impacts of the Preferred Development Plan and Program. Based upon the preliminary results of this evaluation, the Preferred Development Plan and Program (or other aspects of the master plan) may be modified to avoid impacts, thereby allowing for "pre-mitigation." Of course, once the master plan has been modified, the environmental assessment must also be revised.

A Master Mitigation Monitoring Report should be prepared as part of the Master Environmental Impact Assessment, detailing the mitigation measures that would be necessary to alleviate environmental effects of the master plan along with a monitoring plan to ensure their implementation and effectiveness.

Following the public review model of NEPA, draft versions of both the master plan and the Master Environmental Impact Assessment (i.e., EIS) would be published and issued for public review and comment. Comments on both documents would be responded to and both documents would be revised and reissued as the Final Master Plan and Final EIS. Once a Record of Decision (ROD) is filed on the Final EIS, the master plan would be free to be adopted and implemented.

In the implementation stage, the benefits of the proposed integrated planning/environmental assessment process described here can be fully realized as subsequent programs and projects will have a readily-available planning and environmental assessment basis. Specific project or area planning documents can reference the master plan as a policy and informational background document and can focus solely on the area of concern. Similarly, under NEPA, subsequent environmental assessments can be "tiered" off of the Program EIS on the master plan and need only address potential impacts specific to the project at hand. The programwide mitigation monitoring plan prepared alongside the Program EIS can also be used as a basis for streamlining subsequent mitigation monitoring requirements.

Among the subsequent actions that may rely upon the Long-Range Master Plan and Master Environmental Impact Assessment are the Short-Range Construction Programming/Plans and the Mobilization/Mission Plan proposed as part of the update of AR 210-20 (see Chapter 2). Depending upon the sequencing and timing needs of any particular installation, these plans may be evaluated as part of the Master Environmental Impact Assessment or may have more focused assessments tiered off of the program document.

## **Proponent Benefits**

Adoption of an integrated approach to master planning and environmental assessment as described herein can result in a number of benefits for installation proponents, both in the short-run and in the long-run. The primary benefit of adopting such an approach would be the time, labor, and cost savings that could be realized in planning, assessment, and implementation at the specific project and action level. As discussed above, specific projects and actions could take advantage of the comprehensive master planning/environmental assessment conducted early on in this approach and concentrate solely on those planning and assessment aspects that are specific to the project or action at hand. This ability to rely upon a comprehensive base of information would streamline all subsequent projects and actions that fit within the plan. For example, a much-reduced environmental assessment document may be prepared under the "tiering" provisions of NEPA.

While preparation of the comprehensive master plan/environmental impact assessment would take more time and effort early in the process, as projects or actions are implemented in a streamlined fashion, an overall savings would result and would continue to mount through the effective lifetime of the master plan/environmental assessment. Such a comprehensive planning basis would also provide much more flexibility in the range of projects and actions that would fit within it (through its review of alternative scenarios), than would a more standard, generalized master plan.

A less tangible benefit would be the reduced risk of master planning and environmental disasters or "show-stoppers" that result when a comprehensive effort has been expended upfront. Such an effort would be much more likely to reveal potential problems than would a more generalized master planning effort or even a rigorous project-by-project review that lacks a comprehensive overview. In terms of planning economics, it can add an invaluable level of certainty and protection against costly mistakes. For example, a thorough review of factors such as soil contamination and the presence of wetlands habitat early in the master planning process can not only save subsequent planning costs in directing activities towards less sensitive areas, but also the potentially huge costs of remediation and replacement.

A related benefit would be the improved quality of information that would result from early comprehensive planning and assessment. If the base information is thorough and accurate, it would make all subsequent data gathering and planning decisions more dependable. There would also be a less frequent need for updating and supplementing information, again resulting in long-run cost savings.

In the larger perspective, use of the integrated approach should result in installation master plans that are both more environmentally sensitive and more responsive to overall Army and tenant needs. Environmental sensitivity would be encouraged by the early identification of environmental concerns and by the repeated integration of these concerns into the master planning process. Compliance with environmental laws would be enhanced by avoiding conflicts and creating increased awareness.

Improved responsiveness to Army and tenant needs as well as the concerns of the larger community would be provided through an improved disclosure/review process and the presentation of environmental and planning information that is more meaningful. Integration of the master planning and environmental assessment processes in an iterative fashion would allow for public and user review at critical points in the process, when revisions can be easily undertaken. In addition, the documentation would be more meaningful to users and to the public at large, since the importance of facility, land use, and activities planning could be placed within the context of the environment, while (conversely) the significance of environmental issues could be viewed within the context of the master plan.

The integrated process described here would also benefit Army master planners, environmental officers, and associated personnel by providing for improved clarity and consistency in the regulations and allowing for improved coordination among the affected disciplines. Finally, the job of the capital improvements and mission planners would be considerably eased with the provision of a comprehensive

master planning basis that is fully supportive of the urgent "short-fuse" needs of specific projects and missions.

### **Integration Into Existing Processes**

As discussed in the previous two chapters (under "Recommendations"), implementation of an integrated planning approach will require an overhaul of the Army's master plan regulation (AR 210-20) along with a consistent updating and revision of other relevant master planning regulations and technical manuals. The Army's environmental regulations, which already support integration, will not require revision.

An extensive revision of AR 210-20 is currently underway. This revision effort provides a good opportunity to incorporate these ideas. The introduction of an integrated approach is particularly timely since HQDA has established a goal of updating and completing associated environmental review of all installation master plans by 1995 (DAEN-ZCI-P [210-20a], Memorandum dated 27 March 1989). Since issuance of this directive, installation master planners and environmental officers have grappled with the inconsistencies and cumbersome requirements of the current planning regulations and the lack of clear direction on how best to integrate the environmental and master planning processes. Many of these concerns were expressed in a Master Plan/Environmental Assessment Meeting held by TRADOC on 6 December 1990.

The approach presented here is meant to help provide a clearer, simpler policy basis for implementing the HQDA directive for completion of master plan/environmental assessment updates and enhancement of environmental compliance. In addition, it responds to many of the concerns expressed by the users of the planning process (i.e., installation master planners and environmental officers) at the TRADOC meeting and other forums.

It is recommended that the proposed integrated approach be implemented first through the revision of AR 210-20 (as recommended here) along with the presentation of workshops and training seminars to familiarize users with the new process. Once these revisions are underway, the remaining recommendations of this report may be pursued, including consistent revisions to other documents, preparation of a model master plan, guidelines on preparing Master Environmental Impact Assessments, and further research. Exploration of the automated tools and techniques that may be used to assist the integrated master planning/environmental assessment process is presented in the following chapter, along with further recommendations to enhance the use of such tools.



## 5 AUTOMATED TOOLS AND TECHNIQUES: AN AVENUE FOR INTEGRATION

The opportunity for the application of computers and automated systems within the DEH environment is tremendous. Nearly all DEH activities can be automated . . . . The purpose of information management within the DEH is to ensure that vital information is collected, properly analyzed, and distributed back to the appropriate groups to support DEH management objectives and missions. Automation facilitates collection, analysis, and distribution of information has other benefits including: expanded capabilities of the DEH divisions, branches, sections, and individual personnel, improved accuracy and traceability of data, increased speed in task execution, provision of centralized, standardized information, reduction or elimination of repetitive tasks, the provision of more information so that more knowledgeable decisions can be made, [and] reduction of errors (TN 420-10-01 pp 7-1, 7-2)

### Introduction

Automated computer mapping, graphics, and data manipulation have an important place in the processes of both master planning and environmental assessment. Master planning is highly oriented to spatial design and environmental assessment to geographic information. For master planning, spatial applications are not just limited to urban and architectural design, but are also applicable to other planning elements such as land use functions, environmental concerns, facility use, and utility and transportation efficiency. The spatial character of land (i.e., geographic information) is a common denominator for virtually all of the various aspects of master and environmental planning. In simplified terms, Army master planning can be viewed as the spatial arrangement of human activities in an installation for the fulfillment of specific military missions. The role of automated graphics and mapping systems is to depict the spatial quality of the planning process.

The simplest dissection of the master planning process yields three basic questions: (1) What do we have?; (2) What do we want?; and (3) How will we get there? The first question concerns the existing condition of an installation, including both its man-made and natural environment. The second question addresses the missions and activities of the installation. The last question discusses the final product of the master planning process, generally referred to as the master plan, although it comprises more than one document. The final master plan is a product of the analysis of the first two questions. Currently, the bulk of automated mapping and graphics applications lies with questions one and three.

In general, it can be said that mapping and graphic systems operate in two languages or realms: data and information. "Data" is the basis for information. They are bits of knowledge or observations of real world phenomena. For instance, a map of the existing road network in an installation displays data. "Information" is inferred from data as a result of aggregation, manipulation, and permutation that takes on a form that is applicable to the specific case of the user. For example, a map that prioritizes regions by transportation needs aggregates much data into useful information.

Not all data or information can or should be represented through mapping or graphics. In fact, most of our data and information are better communicated in text. The choice of data for graphical representation can be based on three qualities: spatial, statistical, and imagery:

1. **Spatial quality** is concerned with location, connectivity, distribution, and accessibility/distance. Data with spatial quality provides information on the matters of proximity, compatibility, adequacy, efficiency, and conflicts. In the case of master planning, the common denominator of land provides a useful point of reference in evaluating the spatial quality of more than one set of data. For instance, an installation planner can review regional accessibility by overlaying a transportation network map onto a land use map. In essence, the planner is making a judgement based on criteria comprised of a series of "and/or" scenarios (i.e., Boolean relationships).

2. **Statistical quality** is displayed by all numeric data of both a discrete and continuous nature. Statistical graphics are useful for data descriptions. The common concerns addressed are centrality, frequency, and range of distribution. Statistical information can help examine cross relationships between sets of data. Planners often use charts and graphs to present statistical findings graphically. Among the most popularly used are bar, pie, line, and scatter graphs.

3. **Imagery quality** is basically pictorial. Data with image quality can be illustrated by graphical elements like shape, scale, size, texture, and color. It need not be bounded to a specific location, but can be primarily used to depict a pictorial concept, such as landscaping requirements and street furniture design. In most cases, its communicative emphasis is on the appearance or form of a subject.

This proposed categorization of graphical data can serve as a framework for the following discussion on integrated computer graphics system. It should not be taken as a complete topology of the subject matter for at least two major reasons. First, the three categories are not mutually exclusive. Some data can fit into more than one of these categories. For example, a construction drawing of a building has a strong spatial as well as imagery quality. Second, the topology is not exhaustive. There are insufficient categories for all types of data to be classified into at least one class. An example is a flow diagram, which can be classified as neither spatial, statistical, or as an image in quality. An integrated graphics system should allow for the preparation of all three types of graphics.

#### **Master Planning/Environmental Assessment Applications**

Recently, the use of automated computer and other information management systems in master planning and environmental assessment activities—and the potential for increased applications—has grown dramatically. This use has been facilitated by an array of accessible software packages, reductions in both hardware and software costs, and the application of CADD (Computer Aided Design and Drafting), GIS, spreadsheet, data base management, and desktop publishing programs to smaller computer systems.

The Army has recognized these opportunities and a variety of software applications useful to master planning and environmental assessment have been developed. The relevant programs have been catalogued in USACERL's Special Report P-89/18 (Piety et al. 1989). (See description of relevant programs below). In addition, USACERL's Technical Report P-88/19 (McDermott et al. 1988) provides a comprehensive guide to the selection, acquisition, implementation, and management of automated graphics systems for DEH users.

Despite the increasing availability and use of computer applications in the master-planning, other DEH, and environmental assessment functions of the Army, there has been little recognition of this use in the relevant Army regulations. The use of such systems is left up to each installation command, and indeed, varies depending upon the specific needs and resources of the installation.

While there has been no overall policy statement calling for the use of automated systems in planning and environmental applications, use of USACEPL's GIS "Geographic Resources Analysis Support System" (GRASS) has been specifically promoted, in a Memorandum regarding the currently ongoing update of the Army's master planning regulation, AR 210-20 (DAEN-ZCI-P Memorandum, 22 May 1990) (Appendix A). According to this Memorandum, the environmental overlay component of an installation master plan should use "a GIS/GRASS environmental data base compatible with other DEH data bases and systems such as ITAMS [Integrated Training Area Management System] and CADD. This will make the master plan a truly interactive management decision tool" (DAEN-ZCI-P, Memorandum 22 May 1990, item 2 (h)). If this direction is followed, the updated AR 210-20 should pave the way for

increased use of such systems in one of its most obvious and tested applications (i.e., the overlaying of different levels of environmental information).

Use of the GRASS system in the master planning process, as suggested above, would be an important step in the efforts to integrate master planning and environmental assessment as promoted in this report. A well-developed GRASS data base of environmental and geographic information can provide a powerful and accurate basis from which to produce an environmentally-sensitive future land use plan and a fully informative, comprehensive environmental impact assessment. Compatibility of the GRASS system to CADD applications would help to provide a time-saving and accurate link between plan preparation and implementation of improvements. It is hoped that the ultimate cost savings associated with the integrated approach (discussed in Chapter 4) would help to justify the start-up costs of GIS systems. Nonetheless, the appropriateness of using such a system depends upon a number of factors, such as base size, environmental characteristics, and extent of expected changes in land use and activities.

There are a number of other ways in which automated systems may be used to promote the integration of master planning and environmental assessment. Development of a comprehensive Master Environmental Impact Assessment at the master plan level (as advocated in this report) would be particularly conducive to the many environmental assessment applications developed as part of the Environmental Technical Information System (ETIS) and other programs. Programs designed to enhance environmental compliance by tracking legislation, and programs designed to track mitigation implementation would also be particularly useful at this level. For some installations, a "zoom-in" on sensitive areas using video/computer and other hypermedia applications may be used as effective communication techniques in "town hall," IPB, and NEPA-required forums.

It is clear that the applications of computer technology to master planning and environmental assessment is a vast field. Examination of such applications within the context of an integrated master planning/environmental assessment process and the search for further linkages between the two fields must realistically be the subject of a separate investigation. Finally, the use of automated systems cannot act as a substitute, or even as the central component, of either the master planning process or the evaluation of environmental impacts. Neither of these areas is scientific or abstract enough to permit such a use. Rather, automated systems must be seen as merely powerful information and data manipulation tools, and not as decisionmaking tools in themselves. Perhaps this is best illustrated by the attempts to use automated systems to scale and weight environmental impacts to determine the "best" alternative. Regardless of the level of sophistication of the automated system, there is no substitute for human experience and knowledge of environmental impacts as a whole in assigning priorities and making decisions. In fulfilling the requirements of NEPA, project critics and the public at large will be more impressed with the level of honesty and reasonableness in interpretation of environmental effects (that have been scientifically-established, where feasible) than in a "cut-and-dried" evaluation system.

Wise selection and management of such systems is also necessary to avoid the pitfalls of over-dependency on computers (excessive training time and costs, development of obsolete or incompatible products, and the creation of additional work and personnel to run the systems). Use of the procedures outlined in the DEH Automated Graphics Guide (McDermott et al. 1988) should help to realize the full benefits of automated systems and to avoid the perceived drawbacks.

### **Current Systems**

The U.S. Army has developed a number of automated computer systems that are useful in the master planning and environmental assessment processes. These systems include geographic information systems (GISs), computer-aided design and drafting (CADD) and related systems, data management systems,

information retrieval systems, and project management/tracking aids. Those systems relevant to DEH functions have been catalogued in USACERL's Special Report P-89/18 and guidance in the acquisition and implementation of these systems is provided in USACERL's Technical Report P-88/19.

The systems of most relevance to integrated master planning/environmental assessment are listed and described in Appendix B. The reader is referred to Special Report P-89/18 for further information.

## **Recommendations**

There is a growing use of automated tools and techniques in the areas of master planning, project planning, and environmental assessment. There are almost limitless applications of computerized systems for these functions. The Army and private industry have responded with the development of dozens of systems to assist master planners, environmental planners, and design professionals in preparing, assessing, and implementing plans. What is needed now is a cohesive system to achieve some level of consistency in the use of automated systems in the master planning/environmental assessment processes and to achieve the goals of integrating these systems.

To further the application of automated technology to the Army's master planning and environmental assessment processes and to the integration of these processes, it is recommended that the Army:

1. **Conduct a Technical Study Exploring the Use of Automated Systems in Enhancing the Integration of Master Planning With Environmental Assessment**

Realistically, adequate exploration of automated means to encourage the linking and integration of the installation master planning and environmental assessment processes will require its own technical study apart from the overview presented here. This technical study can examine possible modifications in the use of current systems and the potential for the development of new systems to encourage this integration. Modifications can also be examined to respond to revisions to AR 210-20 and to enhance environmental compliance in general.

2. **Develop a Policy Statement Regarding the Use of Automated Systems**

Development of a policy statement regarding the use of automated systems in master planning and environmental assessment would help to encourage use of these systems in an efficient, consistent manner. This policy statement could clearly link the use of automated systems to the various Army regulations governing master planning and environmental assessment. It could help to clarify the options available to master planners and environmental personnel and lead these personnel to valuable resources such as USACERL's Special Report P-89/18 and Technical Report P 88/19.

3. **Expand the Use of GIS's With Linkages to CADD and Other Programs in the Preparation of Master Plans and Environmental Documents**

As stated in a recent Army memorandum, the use of the GRASS GIS with compatible linkages to installation CADD (including the AM/FM and CAFM systems) and other facility planning programs should be encouraged to promote truly interactive management decisions (DAEN-ZCI-P 22 May 1990). Such a grouping of systems should result in enhanced environmental compliance and integration of master planning with the environmental assessment processes. This directive should be reflected in the AR 210-20 update and in future research and development of automated systems.

#### **4. Explore the Relationships Between CADD Systems and Facility Data Bases**

Installation planners have begun to link CADD systems (including AM/FM and CAFM) displaying building area/land use maps with tabular data regarding these facilities (such as the TAB program). There are four possible ways of linking these two vital types of information. First, internal check points can be created for consistency between graphics and text data. For example, the number of buildings in a certain facility code can be totalled for both documents. Second, a powerful CADD system can be employed to drive the spreadsheet data base, i.e., by updating information on the map, the spreadsheet can be modified accordingly. Third, a powerful spreadsheet can be employed to automatically update the graphics. Fourth, a combination of the second and third options can be employed with the planner selecting either an update of the graphics or of the spreadsheet. These options should be explored and developed further to create a range of available graphic/data-base linkages for use in installation planning.

#### **5. Develop Systems To Reflect Modifications in Army Regulations**

The ongoing modifications to the Army's regulation governing master planning, AR 210-20, and related publications, will result in the need to update the automated systems that support these regulations.

#### **6. Explore the Potential for Using Hypermedia in the Preparation and Presentation of Master Plans/Environmental Documents**

Hypermedia can be a powerful new tool in using nonlinear information retrieval to access and modify master planning and environmental information. Used in conjunction with video technology, hypermedia can also be an impressive means to convey planning and land use information to the public. For example, hypermedia can allow the user to access floor plans, building specifications, a series of photographs, etc., simply by indicating (i.e., clicking a "mouse" at) any location on an installation land use map. Further exploration of the potential to use hypermedia as a working platform for installation planners is needed.

#### **7. Explore the Development of Master Environmental Assessment Impact Programs and Data Bases**

With increased emphasis on comprehensive environmental assessment as a first step and subsequent environmental review "tiering" from this, the use of automated systems to develop a master environmental data base becomes more attractive. Such data bases could be developed for individual installations to serve as an automated template for testing future environmental impacts and for preparing project-level environmental documents.

#### **8. Strengthen the Current ETIS Functions by Exploring Links to GIS's and/or CADD's**

Development of linkages between the ETIS environmental assessment programs and an installation's GIS and/or CADD would help to expand the comprehensiveness and accuracy of environmental data and could be used as an important tool in preparing environmental documents.

#### **9. Develop an Automated Assessment Technique and Program Listing for EIS Preparation**

Given the number of automated programs that have been developed to assist in preparing EISs and other environmental documents, developing an automated listing of these programs and assessment techniques could be a valuable, time-saving tool. Such a listing could also include information on accessing automated systems that have been developed by other units of government or by private industry, such as the Federal Highway Administration's noise impact models or the Transportation Research Board's trip generation models.

**10. Develop a "Smart" Computer Inquiry System for EIS Users**

Usability of environmental documents could be enhanced by developing a "smart" computer inquiry system allowing the user to quickly focus on specific concerns and questions interactively.

## **6 CONCLUSIONS AND RECOMMENDATIONS**

### **Conclusions**

The master planning process can be made more responsive to environmental concerns by establishing a clear policy focus in this direction and by integrating these concerns early, and continuously through all stages of the process. The master planning process can also be made more efficient and more cost effective, and can be made to more closely resemble a rational facilities planning approach by simplifying the process; by eliminating redundant analyses and the need for component plans; and by clarifying the sequencing of master plan tasks. The current update of the Army's master planning regulations presents a good opportunity to introduce a fully integrated approach that would help enhance environmental sensitivity and compliance with regulations.

Several Army regulations and guidelines address environmental concerns, including those associated with environmental quality and protection and those associated with the assessment of environmental impacts. For the most part, these regulations and guidelines are consistent and complementary in covering the full range of environmental concerns. However, there is room for improvements in the important area of environmental compliance. Despite the clarity and strength of the Army's environmental regulations, problems with compliance continue. There is also a potential for a voluminous, redundant array of environmental documentation to be prepared in response to the various environment regulations for any given Army installation. Solutions to compliance problems lie in administrative procedures, education, training, coordination, and in increased emphasis on the relevant regulations and guidelines.

A tiered environmental review process based upon a comprehensive Master Environmental Impact Assessment of an installation Master Plan with subsequent more detailed analyses, is one way to better integrate the master planning/environmental assessment processes, while providing improved support for installation program and mission goals. This tiered process would improve the environmental responsiveness of the master planning process and the level of compliance with NEPA, while reducing the overall costs associated with environmental review.

### **Recommendations**

To enhance compliance with the Army's environmental regulations and improve integration of environmental concerns with the master planning process, it is recommended that:

1. Environmental assessment should be considered early in the planning process, be prepared concurrently with the master planning effort and should foster environmentally sensitive decisionmaking. Environmental constraints should be identified as one of the first steps in the master planning process and a preliminary evaluation of potential environmental impacts should be conducted early enough for the master plan to be revised to achieve greater environmental sensitivity.

2. A Master Environmental Impact Assessment (i.e., Program-level EIS) should be prepared concurrently with master plan preparation, and subsequent tiered environmental documentation (using the Master Environmental Impact Assessment as a basis) should be prepared on specific projects or master plan components as they are implemented. This process is illustrated in Figure 5 and discussed further in Chapter 4. This process should also serve to reduce redundancy in installation environmental documents and to achieve a level of "pre-mitigation" for the master plan.

It is recommended that this proposed integrated approach be implemented first through the revision of AR 210-20, along with the presentation of workshops and training seminars to familiarize users with the new process. Once these revisions are underway, the remaining recommendations of this report may be pursued, including consistent revisions to other documents, preparation of a model master plan, guidelines on preparing Master Environmental Impact Assessments, and further research.

3. The Army's master planning regulations should be revised and updated to integrate the environmental assessment and planning processes described here and to increase emphasis on environmental compliance.

4. The Master Planning Process should be simplified and streamlined. The master planning process as set forth in AR 210-20 has grown too complex. The revised process shown in Figure 5 would simplify and streamline the planning process by eliminating redundant analysis, eliminating the requirement for component plans, and clarifying the sequencing of the master plan tasks.

5. The Master Planning process should be revised to more closely follow a rational planning approach. The master planning process has grown far removed from the rational planning approach as typically applied to facilities planning. Application of a rational approach—involving a clear process from definition of goals and objectives, to concept plan preparation, to evaluation of alternatives, to preparation of a preferred plan and program, to implementation—would help to provide a solid, defensible basis for installation planning and construction decisions. To improve the usefulness and flexibility of master plans, a range of types and intensities of activities and uses should be addressed so as to encompass any likely development scenario.

6. An official Army environmental policy statement should be developed. A number of suggested environmentally-related goals could be combined with those already expressed in the Army's regulations to create an official, comprehensive Army environmental policy statement to help underscore the Army's commitment to environmental protection, resolve any apparent inconsistencies or lack of clarity in current regulations, and give a boost to education and compliance efforts.

7. Emphasis on mitigation funding and scheduling should be continued. Preparation of a program-wide mitigation monitoring plan on an installation master plan can serve as a basis for subsequent, more specific mitigation monitoring plans for actions and projects implementing the master plan. This can ultimately result in cost savings and improved follow-through of planning objectives at the project level.

8. An improved connection between master planning and project construction should be provided. Preparation of a short-range element of the master plan (zero to 5 years) that is tied to the Army's PPBES cycle will improve the connection between master planning efforts and actual project implementation.

9. Mobilization/mission planning should be made a more integral part of master planning. Preparation of a mobilization plan as an element of the master plan will help to account for important mission/mobilization needs through the master planning process. Increased funding for the preparation of the mobilization/mission master plan element should be available from mobilization funding sources. Similarly, construction funds should be applicable to short-term master planning.

10. Internal coordination needs to be improved. During the master planning process, coordination and communication should be improved among all involved planning and design professionals. This should be facilitated by the increased emphasis on project-level planning as part of the short-term master plan and through the clarification and revision of the relevant regulations and guidelines. Special training should be considered to help the involved professionals better understand the needs and work of the other involved fields.



11. External coordination with other agencies and surrounding communities needs to be improved. It may be possible to add surrounding community representatives to the Installation Planning Board as nonvoting members. Special Installation Planning Board meetings could also be held as community forums. The frequency of installation planning board meetings could also be increased.

12. Automated technology can and should be further applied to the Army's master planning and environmental assessment processes and to the integration of these processes. To pursue this, a technical study should be undertaken to explore the use of automated systems in enhancing the integration of master planning and environmental assessment.

Possible applications include use of GIS's with linkages to CADD and other programs; linkages of CADD systems displaying building area/land use maps with tabular data; use of hypermedia in preparation and presentation of master plans and environmental documents; further linkages to the ETIS functions; and development of automated assessment techniques and inquiry systems.

13. A policy statement regarding the use of automated systems should be developed, to clarify the options available to master planners and environmental personnel and to lead these personnel to valuable resources such as USACERL's Special Report P-89/18 and Technical Report P 88/19.

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**APPENDIX A: Memoranda**



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REPLY TO  
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22 MAY 1990

MEMORANDUM FOR SEE DISTRIBUTION

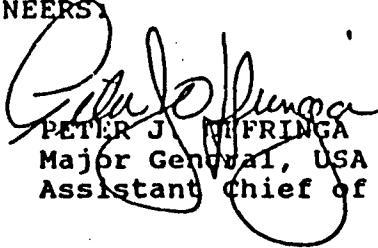
SUBJECT: Environmental Aspects of Master Planning

1. The Chief of Engineers requested I share the attached information paper with you and your staff. It indicates changes being made in master planning to simplify the procedures and products while assuring environmental aspects of the master plan are properly addressed. Interim guidance will be provided as changes are developed.

2. Point of contact for additional information is Mr. Greg Brewer, DAEN-ZCI-P, AV: 223-4583 or COMM: (202) 693-4583.

FOR THE CHIEF OF ENGINEERS

Atch

  
PETER J. MIFFRINGA  
Major General, USA  
Assistant Chief of Engineers

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DAEN-ZCI-P

SUBJECT: Environmental Aspects of Master Planning

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COMMANDER-IN-CHIEF, U.S. SPACE COMMAND

SUPERINTENDENT, U.S. MILITARY ACADEMY, ATTN: MAEN-A

CF:

DIRECTOR, MILITARY PROGRAMS, CEMP-ZA



INFORMATION PAPER

DAEN-ZCI-P  
17 April 1990

SUBJECT: Environmental Aspects and Requirements of Army Master Planning

1. Purpose. To respond to the Chief of Engineers' question: "Seems to me that we should energize the environmental aspects of our master planning on installations -- Tell me how that is now required and executed and if you believe we should enhance the effort?"

2. Facts.

a. There are two environmental aspects of the installation master plan: the incorporation of environmental plans into the master plan and the requirement to do an environmental assessment of the master plan.

b. Para 3-3, AR 210-20, Master Planning for Army Installations, lists component plans, including environmental, which must be part of or summarized in the Installation Master Plan. AR 200-1, Environmental Protection and Enhancement, provides the guidance for the preparation of those plans. Environmental plans are included in the master plan to account for effects of changes in installation mission and population. Such changes will impact the environment, the installation and its surrounding communities.

c. Para 4.7b(1), AR 210-20 requires an Environmental Assessment (EA) be prepared as part of the Future Development Plan, Master Plan Narrative. It is to provide an analysis of the environmental impact of planning proposals. Because the master plan is a decision document it must also comply with the National Environmental Policy Act (NEPA) (AR 200-2, Environmental Effects of Army Actions). Many installations do not currently comply with the requirement because of the expense, confusion and complexity of compliance. Changes in the master plan are being developed which will make compliance easier.

d. The installation master plan should provide the installation commander with a tool for the management and development of the installation real property resources (land, facilities and infrastructure) to accomplish assigned and projected missions. The plan is a compilation of information from other staff elements and DEH plans, environmental considerations, projected stationing population and missions, and the surrounding community comprehensive plans. The primary goal of the plan is to provide for the orderly development of an installation and to raise flags when what is being proposed will be in conflict with the interests of some other function, organization or the law. This will promote future installation viability. The plan is also a way to generate proactive

environmental actions and management.

e. The current master planning process and products are complex, expensive, difficult to maintain and therefore do not effectively support their purpose. For this reason, AR 210-20 is being revised. Good environmental planning through the installation master plan is the means to avoid the types of future problems that we now spend most of our efforts cleaning up.

f. The proposed master plan will be produced as two parts: a short-range (0-6 year) plan based on The Army Plan (TAP guidance) and project specific; and a long range (0-30 year) plan describing general installation development and constraints on future development.

(1) The short range plan will be tied to the PPBES cycle and should seat planning through the Master Plan as an integral part in determining construction, revitalization and even maintenance and repair programming. This plan will be supported by the Real Property Planning and Analysis System (RPLANS) and will provide the basis for the annual update and submission of the installation five year construction program. The long range plan will indicate mission and population changes, capabilities analysis, and limiting factors such as environmental constraints and transportation implications.

(2) The long range plan will also tie the installation plan to surrounding communities' comprehensive plans. It will be general in nature requiring little update unless major mission changes occur to the installation.

(3) The actual components of the new master plan will be fewer with more references to plans developed by others thus simplifying the master plan product. Using the two part approach better reflects the planning process and cycle of the Army. The new master plan will also address mobilization requirements and planning.

g. The proposed new plan format will be loose leaf binder allowing for ease of update. It will reference other necessary DEH and installation plans which will impact real property development and management. The master plan will consist of land use zoning, environmental overlay, general site plan, transportation plan, narrative with environmental analysis, utilities analysis, installation design guide, and tabulation of existing and required facilities. The overall EA will be developed for the master plan addressing, in general, its impacts. Updating requirements should be minimal because of its broad scope. Project specific EIS's will still have to be developed for controversial projects reflected in the short range plan, but documentation will be based on the master plan EA. This will bring the master planning process in compliance with NEPA.

h. The installation master plan environmental overlay component will indicate environmentally sensitive areas. It will reflect wetlands, flood plains, landfills, hazardous and toxic materials areas, endangered species habitats, historical features, unique geographical features, etc.. Future development will include a GIS/GRASS environmental data base compatible with other DEH data bases and systems such as ITAMS and CADD. This will make the master plan a truly interactive management decision tool.

### 3. Conclusions.

a. Revisions to the existing planning process and products mentioned above should lead to a more effective and affordable management tool for the development of installations and will also integrate environmental concerns and planning making it useful in environmental management.

b. A Master Planning Steering Committee (OACE, EHSC, MP, MACOMs) has been established to provide guidance for improving the master planning process and products to make the master plan a more effective and useful decision tool for commanders. It will meet to review and approve this new approach to master planning on 26-27 April 1990.

c. The revised draft of AR 210-20 should be ready for staffing in 6 months. Interim guidance will be issued to the field when appropriate. Target for publishing the revised AR is Spring 1991.

d. Given the ongoing revisions to the master planning process, additional efforts to enhance the integration of environmental aspects into master planning are not now required. Ongoing revision actions will make the master plan a better decision tool, more responsive to environmental considerations.

Mr. G. Brewer/34583



DEPARTMENT OF THE ARMY  
O. FICE OF THE CHIEF OF ENGINEERS  
WASHINGTON, D.C. 20310-2600

REPLY TO  
ATTENTION OF:

DAEN-ZCI-P(210-20a)

27 MAR 1989

9 Jan

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Policy on Environmental Documentation for  
Installation Master Plans

1. References:

- a. AR 200-2, Environmental Effects of Army Actions,  
23 December 1988.
- b. AR 210-20, Master Planning for Army Installations,  
12 June 1987.
- c. CEHSC-FP memorandum dated 10 Feb 89, subject:  
Peacetime and Mobilization Planning Funding Requirements.

2. Paragraph 5-3 of reference 1a identifies the development of installation master plans as an action normally requiring an environmental assessment. This paragraph is also intended to cover revisions to existing master plans. The appropriate level of environmental documentation for any specific action will need to be determined on a case-by-case basis. In some instances, because of the size and scope of a proposal, an environmental impact statement (EIS) may be the appropriate level of documentation. In other instances, if the installation is rather small and static, a record of environmental consideration (REC) might be justified. All master plans developed, updated, or revised require some level of environmental review in accordance with (IAW) the criteria outlined in reference 1a. These environmental reviews will take place either during the initial development of a master plan or the regularly scheduled revision of an existing plan.

3. Reference 1b outlines the requirements for the development of installation master plans and their revisions. Paragraph 3-3 of reference 1b describes "component plans" of the installation master plan. Several of these component plans are natural resource plans that normally require an EA by reference 1a. Because of this, the environmental document prepared on the overall master plan should be programmatic in nature and address the various component plans that have been developed under their own governing regulations (i.e., ARs 420-74, 420-40, 200-1, etc.). This will allow the basic

DAEN-ZCI-P (210-20a)

27 MAR 1989

SUBJECT: Policy on Environmental Documentation for  
Installation Master Plan

environmental document to be used as a "tiering" document to assist in required environmental review of the component plans and other actions related to the master planning process such as the military construction program, proposed land use changes, etc.

4. As paragraph 5-2 of reference 1b requires revisions to installation master plans every five years, HQDA has established a goal to have all installation master plans (to include component plans) environmentally reviewed by the end of 1995.

5. Reference 1c requested that you identify funding requirements for the development of components of installation master plans but did not specifically request the cost for an environmental assessment of the master plan. Request MACOMs provide DAEN-ZCI-P by 24 April 1989 a list of funding requirements to develop appropriate environmental documents to comply with reference 1b. Be prepared to identify in the FY90/91 budget cycle, requirements specifically for environmental issues (both funded and unfunded). An MDEP to support such environmental funding requirements, is under study. MACOM's in the process of identifying such requirements should consider all other existing funding sources (Program 7, lease revenues, etc.) or the possibility of using in-house resources to satisfy environmental documentation requirements for such actions.

6. For each installation identified in your response to reference 1c, please provide the following additional information:

a. Level of environmental review required to support master plan (REC/EA/EIS), FY required, and funding required.

DAEN-ZCI-P (210-20a)

27 MAR 1971

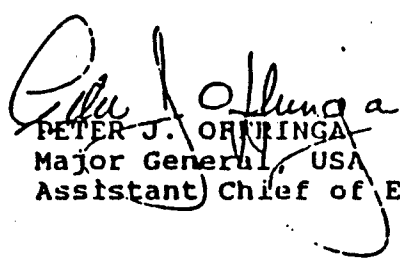
SUBJECT: Policy on Environmental Documentation for  
Installation Master Plans

b. Component plans requiring environmental review IAW reference 1a, and an indication of whether or not they will be assessed as part of overall master plan review. If components are to be assessed independently, provide an estimate of funding required.

c. Installation priorities.

7. Point of contact for this action is Mr. Greg Brewer, DAEN-ZCI, AUTOVON 223-4584.

FOR THE CHIEF OF ENGINEERS:

  
PETER J. OFFRINGA  
Major General, USA  
Assistant Chief of Engineers

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## **APPENDIX B: Automated Tools Systems**

### **Geographic Information Systems (GIS)**

A Geographic Information System (GIS) provides computer-based capabilities to store, edit, display, combine, and manipulate multiple sets of spatial data registered to a common base map. A GIS can handle both graphic and tabular data. Information is usually compiled in individual layers and multiple layers can be combined, either on the screen or in plots, to create a variety of maps. During the analytical process, logical operators (e.g., union and intersection) are applied to these layers. This overlay processing ability not only produces graphic results, but can also generate corresponding tabular reports of the nongraphic information (McDermott et al. 1988). A GIS can efficiently produce the overlay series of maps for an installation master plan, as set forth and guided by TB ENG 353 (see discussion in Chapter 2), with the added benefit of tying it to the tabulation data required for the master plan.

A GIS is well suited to both the installation master planning and environmental assessment processes. These processes require ongoing land use and activities information for a discrete geographic area, the possible evaluation of several land use and resource management scenarios, and the need to synthesize and evaluate multiple environmental data elements—all appropriate applications for a GIS. A GIS can perform conflict and alternatives analysis for an environmental impact assessment. It can allow the user to view a variety of maps simultaneously, to make spatial judgments and to produce a summary table or map of the results. Finally, data on a GIS can be accessed, transformed, and manipulated interactively, a feature which allows the user to test and study environmental trends, analyze different land use scenarios, and anticipate the results of planning decisions (McDermott 1988, pp 46-47).

USACERL has developed Geographic Resources Analysis Support System (GRASS), a GIS for automated data management support to Army environmental planners and land managers. GRASS software is public domain, can be run either with menu selections or user commands, and is designed to run on a supermicro workstation under the UNIX operating system. GRASS has been useful to installation planners and land managers by facilitating optimal training use of available range and maneuver areas, maintaining current lands in a condition suitable for long-term training use, protecting natural and cultural resources, and providing for the accommodation of multiple land uses (McDermott 1988, pp 47-49). As noted above, recent master planning direction advocates the use of GRASS along with other DEH data bases and systems for master planning purposes (DAEN-ZCI-P Memorandum 22 May 1990).

Installation and use of a GIS (such as GRASS) at a military installation can be expensive. In considering the use of such a system, the following factors should be evaluated: (1) the size and environmental complexity of the installation; (2) the intensity of existing and planned land uses; (3) the complexity and impact of mission; (4) the interest, skills, and size of relevant staff; (5) the projected change in land uses and/or mission requirements; and (6) the expertise and potential for technical assistance from the local USACE District (McDermott et al., p 48).

The potential for GRASS (or other GISs) to be linked to other planning and design systems and to serve as an integrating tool for the master planning and environmental assessment processes makes its application particularly attractive. In addition, microcomputer and software add-on options are making GISs more accessible and less expensive. For example, limited capability GISs are now being offered as add-on software programs for popular CADD programs (McDermott et al., p 49).

### **Computer-Aided Design and Drafting (CADD)**

Computer-Aided Design and Drafting (CADD) is the most common automated graphics application in the design field. CADD lets users produce a wide variety of drawings, merge elements derived from

different drawings, and generate the same graphic information at different scales. It can be used as a program base for other applications, including Automated Mapping/Facilities Management (AM/FM) and Computer-Aided Facilities Management (CAFM) (McDermott et al., pp 51-52).

Benefits of CADD include accuracy and speed in drafting standard and repetitive elements, the ability to transmit softcopy data, ability to produce several different scales from a single drawing, organization of information into several layers that can be composed and plotted as needed, realistic modeling and rendering, and the production (as a byproduct) of a fully detailed data base that can be used for the maintenance of a facility. Implementation of CADD can range widely in price depending upon its expected use. It also requires special training of users and restructuring of basic drafting management and workflow planning (McDermott et al., pp 51-52).

In the field of installation master planning, CADD (used in conjunction with the AM/FM and CAFM applications) complements a GIS by providing for a smaller, more detailed level of data on installation facilities, including infrastructure and buildings (i.e., the built environment). This information can be used in capital improvements planning and implementation, facilities management, and space planning.

While a GIS system is useful at the comprehensive planning and environmental assessment levels (particularly for large acreages), AM/FM and CAFM are useful to the installation planner in preparing and implementing capital improvement plans. Use of a GIS system (specifically GRASS) for installation master planning in conjunction with a compatible CADD system (as suggested in the DAEN-ZCI-P Memorandum) would be a powerful tool linking comprehensive master planning/environmental assessment with facilities planning/project implementation in a sophisticated and truly integrated fashion.

#### **Automated Mapping/Facilities Management (AM/FM)**

Automated Mapping/Facilities Management (AM/FM) is a computerized system that allows for the creation, storage, and updating of installation maps. These maps can indicate a variety of information on the installation, such as building locations, roadways, paved areas, topography, site utilities, landscaping, communications systems, historical sites, etc. AM/FM is particularly useful in tracking the location and types of infrastructure systems. It can treat infrastructure systems as networks that can be modeled and analyzed (McDermott et al., p 34).

By integrating drawings with descriptive information about the infrastructure elements represented, AM/FM essentially serves as a "one-stop" digital data base of installation facility information. Automation of this information allows for improved accessibility, greater ease in revisor and updating, and rapid production of composite maps at any desired scale (McDermott et al., pp 34-35).

AM/FM can be extremely expensive to implement. For optimal use, it requires powerful computer capability and constant updating of map data. It is best suited to installations with extensive infrastructure and facility management needs (McDermott et al., p 38).

#### **Computer-Aided Facilities Management (CAFM)**

Computer-Aided Facilities Management (CAFM) is an automated system that can be used for space planning; space needs analysis; floorspace, furniture, and equipment inventory management; maintenance tracking; and allocation of space-related costs. CAFM combines alphanumeric attributes and graphic elements with specialized software for projecting space needs and analyzing optimal efficiencies in spatial layouts (McDermott et al., p 41).



Like AM/FM, CAFM provides an additional level of information for the installation's built environment that may be used in conjunction with a CADD program. While AM/FM is geared to a facility's infrastructure system, CAFM is geared to the "interior" of a facility's structures.

CAFM can also be extremely expensive and time-consuming to implement and maintain, given the detailed graphic and descriptive information needed for its optimum use. For Army installation use, it requires interface with other installation data bases, including the Integrated Facility System-M (IFS-M) and the Real Estate Planning and Analysis Systems (RPLANS) (McDermott et al., p 43).

#### *Integrated Facility System-M (IFS-M)*

IFS-M is a multicommand, automated management information system that encompasses the life-cycle management of the Army's real property resources. It provides information on all aspects of facilities engineering activities and serves as a single-source data base of facilities and budget information to assist managers at all levels of command. Its functions include: real property accounting records; real property facility use, assignment, and occupancy; customer coordination; project planning and mission coordination; job cost accounting; programming and budgeting; contract monitoring; tasking formats; estimating systems; preventive maintenance and supply systems; equipment management; and scheduling (McDermott et al., pp 43-44).

#### *Real Property Planning and Analysis System (RPLANS)*

RPLANS is both a comprehensive automated system for calculating facility requirements by major category code and a prediction model for estimating costs of upgrading and maintaining facilities to support installation missions. It serves as an evaluation tool for assessing space and facility utilization and as a facilities cost guide for force stationing decisions. RPLANS also acts as an automated resource for creating an installation Tabulation of Existing and Required Facilities (TAB) (McDermott et al., p 44).

Both the RPLANS and the TAB systems are described as integral tools in the master planning process in AR 210-20 and the other related reports discussed in Chapter 2.

### **Master Planning Management Programs**

There are a number of automated systems to assist the master planner to prepare, review, and update master plan documents. Use of these programs is tied to the Army's master plan preparation regulation, AR 210-20, described in Chapter 2. In addition to RPLANS (described above), the primary programs are described as follows.

#### *Automated Army Installation and Stationing Plan (ASIP)*

The Automated Army Installation and Stationing Plan (ASIP) is a system that provides unit and stationing information from HQDA to MACOMs and installations. This information serves as the basis for master planning and for the 5-Year Construction Program (see Chapter 2). The system is interactive, permitting MACOMs and installations to make off-line review and comment on the current ASIP.

#### *Automated Master Plan Status System (AMPSS)*

The Automated Master Plan Status System (AMPSS) has been developed by the Army to monitor the progress of master plan development, review, and approval. AMPSS is maintained in the Construction Appropriations Programming Control and Execution System (CAPCES) on the Programming, Administration and Execution System (PAX) (Harland Bartholomew & Associates, Inc., January 1990). Its use is required by the Army's regulation governing the preparation of installation master plans, AR 210-20 (described in Chapter 2).

AMPSS is a useful management tool for master planners. It consists of three files: master plan document development status, master plan review and approval status, and detailed master plan sheet data. Sheet data information is useful for map updating and can be used in conjunction with the GIS, CADD, and/or AM/FM systems described above (Harland Bartholomew & Associates, Inc., January 1990, pp 9-21 to 9-22).

#### *Automated Review Management System (ARMS)*

The Automated Review Management System (ARMS) is a relatively new system developed by USACERL to record and track project review comments and to provide rapid feedback to originators. The system is aimed at making it very difficult for a comment to get ignored or lost (Piety et al., 1989, p 18).

#### *Multi-Year Plan (MYPLAN)*

The Multi-Year Plan (MYPLAN) system is designed to provide automated methods to prepare, review, and approve the Five Year Program (FYP), which is the Long Range Construction Program (LRCP) for the Program Objective Memorandum (POM). These data are maintained in common data fields in CAPCES (Harland Bartholomew & Associates, Inc., pp 9-20 to 9-21).

#### *Decision/Presentation Graphics (D/PG)*

Decision/Presentation Graphics (D/PG) is an automated graphics application that can be used to produce diagrams to explain complicated concepts or procedures, clarify important points, interpret data, show hierarchies, and schedule tasks. These graphics can be produced on paper, overhead transparencies, slides, or the computer display unit. The D/PG software is compatible with virtually all microcomputers and is primarily menu-driven. It is easy to use and can be installed at minimal cost (McDermott et al., 1989, p 57).

D/PG can be useful for generating graphic exhibits for installation master plans and environmental documents and for preparing display graphics for public planning/environmental review forums.

#### *Environmental Technical Information System (ETIS)*

The Environmental Technical Information System (ETIS) provides a set of programs that can be used to analyze the environmental and socioeconomic impacts of Army activities. The ETIS package is particularly suited as an aid in the environmental assessment of installation master plans and other actions as required under NEPA (see Chapter 3). ETIS is designed to serve as a comprehensive automated environmental management system and includes programs to assess environmental impacts, forecast economic impacts, and to track environmental legislation. The purpose of ETIS is to reduce time and costs in preparing EAs and EISs and to allow users to model the environmental and economic impacts of alternative planning decisions (TN 420-10-01, p 7-20).

The system is operated by USACERL through a contract to the University of Illinois, Urbana-Champaign, Department of Urban and Regional Planning. It is accessed by timesharing through terminal and modem hookup in the UNIX system (TN 420-10-01, p 7-20).

ETIS programs of particular relevance to the integration of master planning and environmental assessment include the Environmental Impact Computer System (EICS), Economic Impact Forecast System (EIFS), and the Computer-Aided Environmental Legislative Data Base (CELDS). These programs are described briefly as follows:

### *Environmental Impact Computer System (EICS)*

EICS is an automated subsystem of ETIS that operates as a matrix identifying Army activities and environmental attributes to score actions on a "need to consider" scale. The purpose of the EICS is not to substitute for environmental analysis or the drafting of an environmental document, but to identify the environmental consequences of actions and to guide their discussion in an EA or EIS. Inputs to the program include proposed project information, including economic data, functions, and technical data; and information concerning the existing environment and current installation use and activities. The program output is a matrix of likely and possible environmental concerns (Piety et al. 1989, p 46).

### *Economic Impact Forecast System (EIFS)*

The EIFS is another automated subsystem of ETIS. It allows the user to assess the magnitude and type of impacts on the local economy resulting from potential changes to an installation's use or activities. The system has socioeconomic statistics for every county nationwide. The purpose of EIFS is to identify serious socioeconomic impacts early in the master planning or environmental assessment process so that other alternatives may be considered. Inputs include existing socioeconomic data and information regarding proposed changes in activities/missions. The program output is a socioeconomic impact profile (Piety et al. 1989, p 47).

Also available through ETIS is the Comprehensive Economic Analysis System (CEAS), which is a series of systems that perform regional economic impact analysis, impact region definition, and quantitative analysis (Piety et al. 1989, p 25).

### *Computer-Aided Environmental Legislative Data Base (CELDS)*

CELDS is an automated system for the retrieval and maintenance of informative abstracts of pertinent state and Federal environmental laws and regulations. The data is maintained at a high level of currency, accuracy, and completeness. Information provided by CELDS includes title, number, legislative reference, bibliographic reference, enforcement agency, environmental category, abstract describing the legislation, and other appropriate data. The only input needed to derive a description of relevant environmental laws and regulations is locational data (Piety et al. 1989, p 30-31).

### **Other Environmental Information Data Bases**

In addition to the ETIS programs, there are a number of other environmental information data bases that can be useful in the preparation of environmental assessments and the environmental components of master plans. (Piety et al., 1989, pp 30-90) These include the following: Air Pollution Data Acquisition and Analysis System; Cultural Resources Information Bulletin Board (CRIBB); Cultural Resources Information System (CRIS); Discuss with Experts Environmental Problems (DEEP); Economic Analysis for Hazardous Waste Minimization; Environmental Early Warning System (EEWS); Guild-Based System for Environmental Analysis, Hazardous Expertise (HAZE); Hazardous Materials Management System (HMMS); Interagency Government Coordination for Environmental Planning (IICEP); Integrated Noise Contour System (INCS); Micro-Based Blast Noise Contouring System (MicroBNOISE); National Pollutant Discharge Elimination System (NPDES); Regulations and Compliance Expertise (RACE); and Soils Information System. (See USACERL Special Report P-89/18 for further information on these systems).

### *Air Pollution Data Acquisition and Analysis System*

The Air Pollution Data Acquisition and Analysis System has been developed by USACERL, Environmental Division. It can collect and create a data base of meteorological and air pollutant concentration data and produce data presentation and quality assurance reports. Such information can be useful in the air quality analyses of environmental documents.

### *Cultural Resources Information Bulletin Board (CRIBB)*

The Cultural Resources Information Bulletin Board (CRIBB) serves as an information sharing/communication device (i.e., "bulletin board") for historic preservation offices, archaeologists, and cultural resource managers in the DEH. The Cultural Resources Information System (CRIS) is a multipurpose software data base system that can be used to help develop historic preservation plans and manage cultural resources. Both systems have been developed by USACERL, Environmental Division.

### *Discuss with Experts Environmental Problems (DEEP)*

The Discuss with Experts Environmental Problems (DEEP) is a bulletin board system, available from ETIS, for the exchange of technical information and the pooling of expertise from a variety of environmental professionals.

### *Economic Analysis for Hazardous Waste Minimization*

The Economic Analysis for Hazardous Waste Minimization consists of a generic model for economic analysis of various techniques to minimize hazardous waste generation. It has a variety of submodels to address specific types of hazardous waste. It can be useful in the implementation of mitigation plans. It is being developed by USACERL, Environmental Division (EN).

### *Environmental Early Warning System (EEWS)*

The Environmental Early Warning System (EEWS) allows HQDA and MACOM personnel to quickly identify serious environmental problems associated with proposed changes in troop realignments, mission, natural resource management, and land use. Environmental problems are modeled by means of algebraic relationships and the identification of deficiencies and problem areas that may need attention. EEWS can be useful in mission planning and environmental assessment. The system has recently been developed by USACERL-EN (Piety et al. 1989, pp 30-45).

### *Guild-Based System for Environmental Analysis*

The Guild-Based System for Environmental Analysis is under development by USACERL-EN for use in the environmental assessment and monitoring of wildlife resources. This information can be used to assist in decision support systems for ecological management of training and recreational areas (Piety et al. 1988, p 57).

### *Hazardous Expertise (HAZE)*

Hazardous Expertise (HAZE) is an experimental subprogram of ETIS, available through ETIS (Piety et al. 1989, p 61). It provides an easy, informal medium for hazardous waste personnel at widespread geographic locations and at diverse levels to discuss problems and to exchange ideas.

### *Hazardous Materials Management System (HMMS)*

The Hazardous Materials Management System (HMMS) processes regulatory laws and handles information for hazardous materials, encompassing the Resource Conservation Recovery Act (RCRA), HMIS-SAFE—safety requirements for handling hazardous materials, HMIS-TRANS—how to handle hazardous materials for transporting, and Trade Name Translator (TNT).

### *Interagency/Government Coordination for Environmental Planning (IICEP)*

The Interagency/Government Coordination for Environmental Planning (IICEP) system identifies points of contact for environmental coordinators in state and Federal agencies. It is used by master planners and environmental personnel and is available through ETIS (Piety et al. 1989, p 63).

### *Integrated Noise Contour System (INCS)*

Integrated Noise Contour System (INCS) is an integrated system of noise prediction models that displays noise impacts in contours. It can be used in the formulation of master plans and environmental documents by predicting and graphically displaying the noise impact of proposed land uses and activities. The system is available through Boeing Computer Services and is operated by the Army Environmental Hygiene Agency (pp 34-35).

### *Micro-Based Blast Noise Contouring System (MicroBNOISE)*

The Micro-Based Blast Noise Contouring System (MicroBNOISE) produces noise contours to aid in assessing proposed noise mitigation measures that produce the maximum benefit with the least impact on mission requirements. It has been developed by USACERL-EN (Piety et al. 1989, p 68).

### *National Pollutant Discharge Elimination System (NPDES)*

The National Pollutant Discharge Elimination System (NPDES) processes and monitors water pollution monitoring reports. It can be useful in the implementation of mitigation monitoring plans. It is available through ETIS (Piety et al. 1989, p 72).

### *Regulations and Compliance Expertise (RACE)*

Regulations and Compliance Expertise (RACE) provides an easy, informal communication medium for information on regulations involving environmental issues. Legal questions can be posted on the system for military lawyers to address. The system is available through ETIS (Piety et al. 1989, p 83).

### *Soils Information System*

The Soils Information System provides information on soil properties and interpretations. It can perform data searches and retrieval for Soil Conservation Service soil series and soil mapping unit data sets nationwide. It is available through ETIS (Piety et al. 1989, p 90).

## ABBREVIATIONS AND ACRONYMS

AEO	Army Environmental Office
AICUZ	Air Installation Compatible Use Zone
AM/FM	Automated Mapping/Facilities Management
AMPSS	Automated Master Plan Status System
AR	Army Regulation
ASIP	Army Stationing and Installation Plan
BRAC	Base Realignment and Closure
CADD	Computer-Aided Design and Drafting
CAFM	Computer-Aided Facilities Management
CAPCES	Construction Appropriations Programming, Control and Execution System
CEAS	Comprehensive Economic Analysis System
CELDS	Computer-Aided Environmental Legislative Data Base
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERL	Construction Engineering Research Laboratory
CFR	Code of Federal Regulations
CRIBB	Cultural Resources Information Bulletin Board
CRIS	Cultural Resources Information System
CX	Categorical Exclusions
DEEP	Discuss with Experts Environmental Problems
DEH	Director of Engineering and Housing
DOD	Department of Defense
D/PG	Decision/Presentation Graphics
EA	Environmental Assessment
EBS	Environmental Baseline Study
EEWS	Environmental Early Warning System
EICS	Environmental Impact Computer System
EIFS	Economic Impact Forecast System
EIS	Environmental Impact Statement
EQCC	Environmental Quality Control Committee
ETIS	Environmental Technical Information System
ETS	Engineer Technical Letter
FNSI	Finding of No Significant Impact
FYP	Five-Year Program
GIS	Geographic Information System
GRASS	Geographic Resources Analysis Support System
HAZE	Guild-Based System for Environmental Analysis, Hazardous Expertise
HMIS-SAFE	Safety Requirements for Handling Hazardous Materials
HMIS-TRANS	Safety Requirements for Transporting Hazardous Materials
HQDA	Headquarters, Department of the Army
IC	Installation Commander
ICUZ	Installation Compatible Use Zone
IFS-M	Integrated Facility System-M
IICEP	Interagency/Government Coordination for Environmental Planning
INCS	Integrated Noise Contour System
IPB	Installation Planning Board
IRP	Installation Restoration Program
ITAMS	Integrated Training Area Management System
LRCP	Long Range Construction Program

MACOM	Major Command
MicroBNOISE	Micro-Based Blast Noise Contouring System
MOU	Memorandum of Understanding
MSC	U.S. Army Corps of Engineer's Major Subordinate Commands
MYPLAN	Multi-Year Plan
NEPA	National Environmental Policy Act
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
PAX	Programming, Administration and Execution System
PC	Personal Computer
POM	Program Objective Memorandum
PPBES	Planning, Programming, Budgeting and Execution System
RACE	Regulation and Compliance Expertise
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RPLANS	Real Property Planning and Analysis System
TAB	Tabulation of Existing and Required Facilities
TB	Technical Bulletin
TM	Technical Manual
TN	Technical Note
TNT	Trade Name Translator
TR	Technical Report
TRADOC	U.S. Army Training and Doctrine Command
UNIX	Proprietary name for an operating system program developed by AT&T's Bell Laboratories.
USACE	U.S. Army Corps of Engineers
USACERL	U.S. Army Construction Engineering Research Laboratory
USAEHA	U.S. Army Environmental Hygiene Agency
USATHAMA	U.S. Army Toxic and Hazardous Materials
USC	United States Code

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